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Feasibility of Production and Marketing Blueberries in Tennessee

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To the Graduate Council:

I am submitting herewith a thesis written by Alejandro Enrique Dellachiesa entitled "Feasibility of Production and Marketing Blueberries in Tennessee." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

Charles Hall, Major Professor

We have read this thesis and recommend its acceptance:

John Brooker, David Lockwood

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Dean of Graduate Studies

FEASIBILITY OF PRODUCTION AND MARKETING BLUEBERRIES IN TENNESSEE

A Thesis Presented for the
Master of Science
Degree
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Alejandro Enrique Dellachiesa

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ABSTRACT

The primary objective of this research was to develop a detailed feasibility analysis for blueberry production in Tennessee. The focus of the study was to provide blueberry producers with estimates of the typical costs and returns associated with commercial production and marketing of blueberries. Secondary objectives were to provide pertinent financial information for entrepreneurs to consider when using their available resources to produce what could be a potential opportunity in Tennessee. Another secondary objective was to evaluate options for marketing fresh blueberries.

The objectives of this study were accomplished by constructing cost and return budgets to determine the cost of producing blueberries; by conducting cash flow, breakeven, and sensitivity analyses. This information could be used to evaluate the income opportunities for producers, and to identify marketing options for fresh consumption of blueberries in Tennessee. Three marketing options examined were wholesale, pick-your own (PYO), and Already Picked (AP) on farm sales. Pick-your-own enable customers to select their own fresh product from the field and at a very low cost. Alternatively, the already picked option enables customers to buy freshly picked produce from the farm stall.

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Chapter 1: Introduction

1.1 Current blueberry situation

Blueberries are one of a few fruit crops that are native to North America. Next to strawberries, blueberries are the second most important berry crop in terms of per capita consumption in the United States (ERS, 2003). As early as 1908, cross breeding programs were initiated using wild native plants from New Hampshire and New Jersey (ERS, 2003). During the 1930s several improved varieties were developed and released and subsequently introduced in North Carolina and Washington. Today, about 70 percent of the country's commercial blueberries are from cultivated varieties (ERS, 2003). In 1930, only about 200 acres were cultivated; today more than 40,000 acres are cultivated in North America alone. The harvested acreage has more than doubled over the past 15 years from 21,850 harvested acres in 1980 to an estimated 46,685 harvested acres in 1996.

1.2 Most important blueberry species

The three most prominent species of blueberries harvested and sold commercially in the United States are as follows:

- Highbush (V. corymbosum) – Grow wild in the forests of North America and were used to cultivate the modern Highbush or cultivated blueberry industry along with the V. Ashei.
- Rabbiteye (V. ashei) - More tolerant of the relative warmer temperatures in the southern United States. This specie is called "Rabbiteye" because the calyx on the berry resembles the eye of a rabbit.

- Lowbush or "Wild blueberries" (V. angustifolium and at some extent, V. myrtilloides) - Harvested from managed wild stands in the northeastern U.S. and eastern provinces of Canada

Although blueberry production has been reported from more countries since the early 1990s, production remains highly concentrated in North America (Figure 1) (All tables and figures are located in the Appendix). The majority of cultivated blueberry growers are relatively small business owners, operating 20-acre to 30-acre farms, which have been family owned for a number of generations. The 1987 census of agriculture indicated that 77 percent of United States farms that reported blueberry growers had annual crop sales of less than $25,000. A higher proportion of larger farms were in New Jersey, while 4 percent of the blueberry farms (10 of 251 surveyed) reported sales of $500,000 or more (Walden C, 2002). Off-farm employment is an important source of income for most blueberry growers. Less than half of the growers reported farming as their principal occupation. According to the 1992 Census of Agriculture, there were 5,908 blueberry growing operations in the United States, an increase of about 1,500 farms from the 1987 census. According to the 1997 Census of Agriculture, there were 5,159 wild blueberry farms in the United States, comprising 45,000 acres.

Prior to the 1970s, Canada was the world's largest blueberry producer. Currently, Canada is second and produces 28 percent of world supplies, followed in third place by Poland with 10 percent. Historically, annual cultivated blueberry production was reported for Michigan, New Jersey, North Carolina, Oregon, and Washington only. Beginning in 1992, the National Agricultural Statistic Service began expanding their national survey to

include blueberry production in Alabama, Arkansas, Florida, Georgia, Indiana, and New York (Figures 2, 3 and 4).

1.3 Percentage of fresh and processed production in United States

Blueberries are enjoyed both in fresh or processed forms. Historically, however, a larger proportion of U.S. blueberry production has been processed than sold for fresh consumption (Figure 5). Presently, over 65 percent of utilized production (cultivated and wild) in the United States is processed into storable products, allowing for year-round availability.

Fresh market blueberries, on the other hand, are in season in the spring and summer, mostly from mid-May through mid-August in the Northern hemisphere, and from October to April in the Southern hemisphere, where Argentina is the earliest producer, followed by Chile, Australia, New Zealand and South Africa, respectively. United States-grown blueberries are typically marketed from April through October (Table 1) (Tables are located in the Appendix). Marketing usually begins mid-April in Florida, early May in North Carolina, early June in New Jersey, and early July in Michigan, Oregon and Washington (Table 1).

1.4 Utilization of the North American blueberry production

Processed blueberries are mostly frozen or dried and often used as an ingredient in the manufacture of many other processed products such as baked goods, yogurt, and ice cream. Berries are bulk frozen or individually quick frozen (IQF), a process that ensures freshness while preserving many beneficial nutrients. Most of the wild blueberries are IQF for use in other processed foods. Dried blueberries are ingredients in cereal products

as well as many snack food products. Blueberries are also processed into jams, jellies, concentrates, and baby foods. (Figure 5).

Demand for blueberries in the United States has generally been on the rise since 1980, with consumption of fresh and frozen blueberries both increased over this period. Americans consumed more fresh blueberries in the early-to-mid 1980s but demand has shifted more towards the frozen product for the most part after 1985 (ERS, 2003. Per capita fresh blueberry consumption averaged 0.20 pounds annually during the early 1990s, increasing to 0.34 pounds during 2000-2002 (Figure 6). Estimates for domestic consumption of frozen blueberries increased from an average of 0.22 pounds per person annually during the 1980s to 0.39 pounds per person during the 2000-2002 periods.

1.5 Blueberry potential in Tennessee

Blueberries may represent an economically viable alternative specialty crop for Tennessee producers willing to invest the time, capital, and management into establishing well-managed acreages. Blueberries have the advantage of lower initial establishment costs than other berry crops that usually require trellis systems for production. Once established, properly managed blueberry plants can produce for years. The most prominent species harvested and sold commercially in Tennessee are Highbush and Rabbiteye.

Highbush blueberries tend to be concentrated in the northeast area of Tennessee while the Rabbiteye variety can be found in the rest of the state but mostly in southwest Tennessee (Lockwood, 2003). Some advantages of Rabbiteye over Highbush varieties are that they tend to have higher yields than Highbush and are more resistant to hydric (water

deficiency) stress than Highbush. On the other hand advantages of the Highbush varieties over Rabbiteye varieties include more tolerance to weather extremes, later blooming, and earlier harvest.

Another difference between Highbush and Rabbiteye is the harvest periods. Typical harvest dates for Highbush blueberries in Tennessee may range from June 1 through July 7. For Rabbiteye varieties, harvest might range from about July 1 through September 1. These dates represent harvest windows across the entire state. That is, beginning harvest reflects timing for West Tennessee and ending harvest is for the Cumberland Plateau and East Tennessee. At least 2 weeks difference existed between first harvests in Spring Hill versus Crossville in 2003; the same was true for ending harvest.

According to David Lockwood, Extension Fruit Specialist, "In Experiment Station trials, we started Highbush harvest with the *Duke* variety. *Bluecrop* was 7 to 10 days later in maturity. In Rabbiteyes, we began harvest with *Tifblue,* which is not one of the earliest varieties, and ended with *Centurion* which is a late maturing variety. We have experienced years in which Rabbiteye varieties had fruit until almost frost, but that is not a typical situation and I doubt if the latest fruit to ripen could be considered to be that much of the total crop." Currently, Rabbiteye represents approximately 80% of the total blueberry acreage in the state, while Highbush varieties represent the remaining 20% (Lockwood, 2003). However, many new plantings in Tennessee are of the Highbush varieties.

1.6 North Carolina and Tennessee blueberry production

North Carolina represents Tennessee's closest competitor. In North Carolina, Highbush varieties accounted for 78% of all blueberry acres in 2002, while Rabbiteye varieties comprised the remaining 22% (NCDA, data accessed Jan 2004). This compares with 79% and 21%, respectively, in 1996.

Approximately 40% of the total blueberry acreage in North Carolina is between 3 and 12 years old, compared to 45% in 1996. One-third of the total acreage is between 13 and 25 years old, up 28% from five years ago. Fourteen percent of the acreage is greater than 25 years old, the same relative percentage as 1996, while 14% of the acreage is less than 2 years old, compared to 13% in 1996. North Carolina blueberry growers planned to remove 148 acres in 2001, but planned to plant 428 acres for a net increase of 280 acres, 6% above current blueberry acreage. Approximately 72% of this net increase was to be set to Highbush varieties while the remainder was to be set to Rabbiteye.

The North Carolina Blueberry industry showed solid growth over the last five years. The number of commercial blueberry growers in North Carolina cultivating one-half acre or more in 2001 totaled 135, a 7% increase from 1996, while acreage increased 14% to a total of 4,498 acres.

One-half of the total blueberry acreage is irrigated, up from 35% in 1996. Growers increased use of irrigation not only for drought protection but also for effective frost protection. These trends are important for current and potential TN blueberry producers to consider because of the similarity of growing conditions and market timing that NC producers represent.

Chapter 2: Objectives of the Study

The fundamental purpose of this study is to determine the feasibility of producing and marketing blueberries in Tennessee. This study has three specific goals:

1. To determine the cost of producing blueberries in Tennessee by developing detailed enterprise budgets.
2. To conduct break-even, sensitivity and feasibility analyses to evaluate the income opportunities for producers.
3. To identify and evaluate marketing options for fresh blueberries.

This study is intended to provide blueberry producers with estimates of typical costs and returns of commercial production. While cost and return estimates may vary greatly from case to case, substantial effort was made to reflect common industry practices; however, this study is not recommending a particular set of culture practices or specific materials. The set of practices and materials selected should depend on soil type, climatic conditions, insect and disease pressure, available markets, and managerial ability.

These budgets should be used as a guide to aid producers in estimating their actual costs. Commercial products used as inputs are mentioned solely as examples for the purpose of estimating costs, and not intended to imply they are superior to other similar products or are appropriate in all cases

Chapter 3: Related Literature

Blueberry production guides have been developed outlining the cultural practices associated with producing blueberry crops in Florida (Williamson J., 1997), Mississippi (Walden, 2002), Oregon (Lisec B., 1995), and New York (Pritts M., 1992). These guides generally describe site selection considerations, variety recommendations, pest and disease control alternatives, and other cultural practices associated with blueberry production.

Considerable research has been conducted in the area of production enterprise budgets. The enterprise budget observed below indicates that blueberry production could be a profitable investment with adequate soil conditions, the right varieties for the area chosen and proper management. The Cooperative Extension Service located at the University of Kentucky has developed a production budget estimating cost and returns for Highbush blueberries in Kentucky (Ernst Matt, 2001). The grower prices for their budget were $1.25 per pint for pick-your-own and $1.50 for wholesale. The distribution of production between the two outlets is 20 percent for wholesale and 80 percent for pick-your-own. Marketing cost was fixed as 5% of the gross return. The hand harvest efficiency was 25 pints per hour at a rate of $9.00 per hour. Fifty-six hours of operator labor and 8 hours of family labor are added to the budget at a rate of $9.00 and $12.00, respectively. The report also includes analysis of returns to land, labor, and management.

The Mississippi State University Extension Service has also developed a report of cost and returns associated with producing commercial blueberries intending to provide producers with information on the cost and returns of commercial production (Walden, 2002). The grower's price for their budget was $1.10 per pint for fresh fruit. The hand

harvesting charge was $0.30 per pound. The harvest and post harvest handling cost represented approximately 53 percent of the gross revenue at full production. According to their report, special concern needs to be taken with hand-harvesting and custom packing because these costs represent 72 percent of the cost associated with blueberry production in Mississippi.

The enterprise budget developed by Oregon State University (August 1995) was based on the typical cost of producing ten acres of blueberries in the Willamette Valley of Oregon (Lisec B., 1995). The grower prices for this budget were $ 0.80 per pint for fresh and $0.40 for processed blueberries. The distribution of production was 30 percent for fresh market and 70 percent for the processed market. Harvest and post-harvest costs represented approximately 66 percent of the gross revenue at full production (year 6). Noise cannons for bird control were included in the harvesting activities at a rate of $41.50 per acre. The report also included estimates of economic returns to land, labor, and management.

Penn State's College of Agricultural Science developed a budget for Highbush blueberry production in which they explained six basic marketing options available for blueberry growers: wholesale, marketing cooperatives, local retail markets (grocery stores), roadside stands, pick your own operations, and processors (Demchak K, 2001). The growers' price for this budget was $1.00 per pint for the fresh market. Expenditures in mature planting were approximately 48% of gross revenue, but did not include the harvest and post harvest costs. They also included an analysis of the returns for various prices and yield combinations and the basic resource requirements for their model.

Chapter 4: Methodology

The major assumptions used in constructing this analysis are discussed in the following sections:

4.1 Land, pre-planting and planting assumptions

4.1.1 Land

This study assumes an initial application of organic mulch of 269 cubic yards, which would be reapplied each two years assuming a loss of 1.5 inches per year. Blueberries require well-drained, highly acidic soils with access to plenty of water. Ideally, for optimum production, the soil should be covered with a layer of organic mulch (4-6 inches deep) for the benefits of stabilizing soil temperature and moisture in addition to weed suppression (Pritts M., 1992). Closely-mowed soil should be maintained between the rows and around the perimeter of the planting.

Pine or oak sawdust, oak leaves, peat, or any other highly acid mulch will provide the needed organic matter, which will keep soil temperatures cooler during the summer, reduce weeds, and maintain soil moisture at more uniform levels.

The soil for blueberries should ideally be at a pH of 4.5 to 5.5. If the soil pH tends to be higher than 5.0 and does not respond to acid mulching, aluminum sulfate or (for organic growers) elemental sulfur could be used to acidify it more rapidly. However, these compounds should be used sparingly, for they can burn or even kill young plants. When amending the soil with these chemicals, the plants need time to start showing the effect.

Special consideration in choosing the site should be taken regarding the water source for irrigation. Blueberries require well-drained soils; therefore low-lying areas with high water tables are not recommended

4.1.2 Pre-planting

For optimal development blueberries need soil pH between 4.5 to 5.0. Standard cultural practices for cover crop establishment are followed in this analysis. This study assumes 650 pounds of sulfur at $0.25 per pound is applied to lower soil pH. Most soils can be amended with finely ground sulfur or aluminum sulfate to adjust the pH to the optimum 4.5 to 5.5.

Soil samples from potential sites may be submitted through a county Extension office. The test should check for available calcium per acre, as well as the standard soil test. If the available calcium is below 2,500 pounds per acre, the site's soil can usually be effectively acidified (Strang et al., 1989).

Perennial weeds should be eradicated during the summer before planting because weed control is difficult for the first two years after planting. The budgets herein contain the cost of the application of Roundup.

4.1.3 Planting

Nursery plants that are 2 or 3 years old and 12 to 36 inches tall will usually transplant well. Older plants are usually larger and more expensive and may require some pruning to establish quickly. Younger plants are more difficult to manage. The roots must be moist at all times between digging and replanting. Plant blueberries in early spring before growth starts or in late fall after frost. A north-south row orientation is preferred when possible so sunlight is more uniformly distributed. However, any orientation is

acceptable. Plant bushes in rows far enough apart so that tractors or trucks can be driven between rows. Recommended planting distances are 10 to 14 feet or more between rows to ensure that mowing and spraying can be done by tractor. Planting for PYO operations should allow for customer convenience and handling. Rows should be interrupted with cross-walks or drive alleys about every 200 feet. A total of 605 plants per acre was used in this budget analysis at a cost of $ 2.65 each (Table 8). Cultivar selection is one of the keys to success. Cultivars may need to be selected a year ahead. They should be booked with a reputable nursery.

The University of Tennessee recommended cultural practices (fertilization, pesticides, cultivation, etc) were followed in these budgets. Plant populations were assumed to be 605 plants per acre given a 6 feet spacing in the rows and 10 feet spacing between rows (Table 8). This population is well suited for PYO production; operations that plan to focus exclusively on wholesale production may desire to plant at a higher density.

4.1.4 Production practices

As stated earlier, two species (Rabbiteye and southern Highbush) can be grown in Tennessee. Given that the majority of current acreage is planted with Rabbiteye, the enterprise budget analysis uses assumptions and parameters associated with Rabbiteye production. Regardless of type or variety, from the production standpoint, special consideration must be given to water source and quality, soil characteristics, and variety.

4.2 Machinery, equipment, labor and capital assumptions

4.2.1 Machinery and equipment

Drip irrigation is one highly effective way to insure adequate moisture. Overhead irrigation will also work, but uses considerably more water. Equipment costs (irrigation and machinery) were estimated using data from Table 2.

Fixed machinery costs were also calculated using the Mississippi State Budget Generator (version 6.0). Blueberry production costs include $377 in annual fixed costs for a cooler to maintain berry quality and enhance shelf life (Figure 7). An annual fixed irrigation cost was assumed at $328; this may increase or decrease depending on type of irrigation system (trickle or overhead) utilized. In this budget, a typical trickle irrigation system was modeled.

4.2.2 Labor

Labor estimates were assigned at a wage of $9.00 per hour (includes labor burden such as worker's compensation, FICA, etc) for untrained labor needed in many of the ordinary duties of berry production.

Pesticide application and other more specialized tasks were assigned a rate of $12.00 per hour (Table 3). Due to the labor intensity required in blueberry production, lower wage rates could significantly raise profitability, or vice versa.

4.2.3 Capital

The interest on operating capital was calculated annually at a rate of 9 percent for ½ year because it is assumed most capital requirements will be concentrated in the April through September growing season.

4.2.4 Fertilizers, herbicides and insecticides

The specific fertilizers, herbicides, and insecticides used as examples in this analysis are presented in the table 4. Diseases and insects are not a major problem in Tennessee blueberry production at this time.

For optimum blueberry production, weed management requires a planned approach. In terms of weed control or management, the floor can be divided into zones with different weed management objectives. Within the row, the weed management objective is to maintain a strip devoid of vegetation year round. If mulch is applied following planting and replaced at an average of 1 inch per year, few weed problems should develop.

The fertilizer program should encourage growth of vigorous shoots, which produce more flowers and fruit. Blueberry soils and fertilizer requirements vary considerably. Caution should be exercised with fertilizers because blueberries are easily damaged by excess fertilizer.

4.2.5 Yields in blueberry production

Yields in blueberry production depend on the region or specific location chosen (Figure 8), appropriate annual mulching with pine bark or other organic matter, maintaining the soil pH at 4.5 - 5.0, correct nutrition of the plants, keeping the proper moisture levels in the soil, proper weed control, and prevention of possible phytosanitary problems.

4.3 Harvest and post-harvest assumptions

4.3.1 Establishment and harvest

No crop will be harvested the first two years. Properly managed plantings will initiate production yield as seen in Table 5. The maximum anticipated yield at crop maturity is 12,000 pounds per acre. With adequate care, mature Highbush should produce almost 20 pounds per plant and mature Rabbiteye 25 pounds per plant.

Harvested berries were assumed to be sorted into 1-pint plastic clamshells. No cost was assigned for picking containers. Purchase of these containers may occur in years 3 or 4. A marketing expense of 15% of the gross sales was assumed. Ten to fifteen pickers are needed per acre for hand harvesting. For this study the estimated harvest rate for picking blueberries was 25 pints per hour.

4.3.2. Storing and packing

Following harvest, blueberries should not be allowed to remain in the sun because the dark fruit can heat up rapidly. At this point, decay is the primary source of berry loss (Figure 7). The best way to assure top quality fruit is to delay picking until several days after the fruit has turned fully blue. This waiting period allows the pulp to go from mealy (as in many supermarket berries) to soft, juicy and flavorful. Whether blueberries are mechanically or manually harvested, every effort should be made to keep the percentage of defective fruit to an absolute minimum. U.S. Number 1 is the only specified grade for harvested blueberries. Blueberries grading U.S. Number 1 may have no more than 1 percent serious defects and no more than 13 percent total defects. However, in practice and especially with fresh-market blueberries, buyers may require less than 5 percent total defective fruit. Blueberries are marketed in 1-pint plastic clamshell containers that cost is

$ 0.16 per unit. A refrigeration unit (8' by 8' by 9') was purchased in year 3 with an estimated operating cost of $35.70 for the harvest period.

4.4 Markets and prices

- Markets

It has been said that marketing is the key to profitability. Each marketing alternative option for blueberries has its own characteristics that make it more or less attractive to different blueberry growers. Farm location, volume of blueberries at different times of the season, time and labor available for marketing activities, and post harvest berry quality are some of the important considerations for choosing a market option or combination of options. However, planning for marketing should ideally begin even before selecting cultivars and planting them. Market options are classified as either direct or indirect. Direct markets include growers in contact with the public. Pick-your-own and Already-picked sales at farmers' markets or roadside markets are particularly feasible for small-scale operators in close proximity to metropolitan areas. Indirect markets involve market intermediaries that include terminal markets and cooperatives, sellers and/or users such as independent grocery stores, local restaurants, and wholesalers/brokers.

Closer to cities, pick-your-own operations (PYO) should be considered. Consumers doing the harvesting can usually select fresher, higher quality blueberries at lower prices and the farm can operate with less labor and fewer packing facilities. Higher volume markets should be located on highways near cities or towns of at least 5,000 people, from about three to no more than 12 miles from the population center. About 450

PYO customers can harvest 1 acre of blueberries (6,000 pounds). PYO blueberries are usually sold by weight in pounds and/or ounces. In the case of pick-your-own operations, an adequate parking area, restroom facilities, and convenient and safe access should be considered. Because accidents do occur growers must have adequate liability insurance. A regular farm insurance policy may not cover liability to PYO customers, so growers should consult with their insurance agent.

Roadside markets are usually located at or near the blueberry farm, beside a well-traveled highway. They are most heavily patronized when blueberries are in season locally. Sales are concentrated in the United States on Saturdays, Sundays, and holidays. Employee attitude is very important in a successful roadside market. Because profitability depends on repeat sales, attention to customers is most important.

Terminal markets are usually located in major cities where rail, trucks, and cargo airlines are readily available. Brokers, wholesalers, distributors, and/or jobbers are all present in terminal markets. Produce from several regions, domestic and foreign, is assembled and shipped. Advantages of terminal markets include the capacity to market large quantities of produce at one time and the market information available at the outlet. Also, large growers may be able to sell through several buyers. A disadvantage is that buyers usually require high quality blueberries delivered in containers compatible with loading and handling equipment (Powell, 1990).

Marketing associations (cooperatives) are organized by growers or other entrepreneurs to construct facilities to receive, grade, and market blueberries. On doing so, cooperatives can maintain consistent quality which ensures consistent business and, consequently, consistent new blueberry referrals.

Marketing is an integral part of successful blueberry production. Typical marketing charges may vary from 10 percent to 15 percent of the price. Therefore, the midpoint of 12.5 percent was used in this analysis. This cost may include transportation to market, appropriate signage, labeling, packaging, cooperative marketing arrangements with other producers, and other relevant marketing costs. Like any other crop, producers will find that proper post harvest handling in blueberries will increase profitability.

- Prices

Prices drop sharply in late May, when blueberries from North Carolina become available (Walden C, 2002) (Figures 9). Prices are lowest in July, which is the period when New Jersey and Michigan start shipping berries. Prices received by North Carolina growers in early May through July, during the decade 1991 through 2000 seem to have a positive trend. For this study, the average price of this decade (1993-2002) is used. (Table 9). Therefore, the blueberry price by pint (direct marketing) is $1.25 per pint.

Consumer surveys made by the University of Kentucky (UK) in 2003 show that consumers at a Farmers' Market are use to paying $ 3.00 per pint for fresh blueberries (Ernst Matt, 2003). According to the survey, Lexington Farmers' Market customers would be willing to pay an average of $ 3.14 per pint of blueberries in season. This study also showed that most of the people responding to the survey at the farmers' market indicated that they were willing to pay whatever the market price was. In Metcalfe County, some 150 miles southwest of Lexington, CB Foods featured local, hand-picked blueberries for $ 1.88 per pint. The consumers surveyed there during one Saturday of shopping indicated that they would be willing to pay, on average, $ 2.08 per pint for blueberries.

Wholesale prices for local berries at both these outlets were well within the $1.25-$2.00 range Kentucky farmers received the year of the survey. UK estimates that growers can make adequate profits from blueberry production at such wholesale price levels. Those growers willing to market their own berries at "premium" markets (like the farmer's market) can expect to generate significantly greater profits from their efforts. The report also found that producers willing to tailor their production for PYO markets can often capture higher profits than wholesale producers. This is because PYO reduces labor costs, the largest cost for wholesale blueberry production. According to the UK estimates, those willing to develop a PYO blueberry market in their area can make $800 to $1,500 more per acre over wholesale berry production when charging a price of $1.25 per pint (Ernst and Woods, 2003). The survey indicated that about half the consumers at both markets would be interested in picking their own berries at a nearby farm. Lexington Farmers' Market customers said that they would be willing to pay $2.14 per pint for PYO blueberries. Interestingly, some of those surveyed at the farmers' market indicated that they would be willing to pay more than they were paying at the market just to go to a farm and pick their own berries.

Chapter 5: Results and Discussions

Detailed production budgets were developed during 2003-2004 to analyze potential profitability of blueberries in Tennessee. Budgets were developed for three marketing scenarios including:

1. A scenario where 100 percent of the blueberries are produced for the wholesale market.
2. A scenario where 50 percent of the blueberries are direct marketed via Pick-Your-Own (PYO) and 50 percent marketed on the farm Already Picked (AP).
3. A scenario where 75 percent of the blueberries are direct marketed via Pick-Your-Own (PYO) and 25 percent marketed on the farm Already Picked (AP).

5.1 Results for wholesale scenario

The production budgets for the wholesale marketing scenario are found in Tables 10a through 10h, and are summarized in Table 11. When establishment costs are annualized, the basic economic decision revolves around price versus harvesting and packing costs since maintenance or growing costs are comparatively low (Table 10). This is particularly important information to take into account for new entrepreneurs when choosing the location of their business. In our analysis, these costs represent approximately 73 percent of the average total costs over the first ten years of production. Mulching is the second largest cost and has to be taken into consideration because it represents 13 percent of the total average cost of the first ten years of production. Irrigation costs are the third largest cost of producing blueberries representing 3 percent of the total costs.

The Mississippi State University Extension Service reported a harvest and post-harvest process cost that represented approximately 53 percent of the gross revenue at full production (year 6). In the case of Oregon State University, these costs represent 66 percent of the gross revenue at full production and in our study these costs represent 56 percent of the gross revenue (Lisec B, 1995). According to this information, special concern should be taken with hand-harvesting and custom packing because it is going to have a very significant impact on the profitability of the business.

Another consideration for producers who are considering blueberry production in Tennessee is that they are going to have a financial outlay of close to $10,000 dollars per acre for the first three years and that the cash flow will be negative until the fourth year (third year after planting) with the price and yield assumptions of $1.20 per pint and 12,000 pints per acre.

The estimated wholesale total *gross* revenues per acre of mature Tennessee blueberries range from $4,800 at a low price of $0.80 and a low yield of 6,000 pints per acre to $25,000 at a high price of $1.80 and a high yield of 14,000 pints per acre (Table 13a). A typical situation is between 10,000 to 12,000 pints per acre. The average price of the last decade was $1.25; making total gross revenue per acre of $12,500 to $15,000.

The estimated wholesale ***net*** revenue per acre of mature Tennessee blueberries ranges from -$5,717 at a price of $0.80 and a yield of 6,000 pints per acre to $14,683 at a price of $1.80 and a yield of 14,000 pints per acre (Table 13B). A typical yield of 10,000 to 12,000 pints per acre value at the average price of the last decade ($1.25) would yield a total gross revenue per acre ranging from $1,983 to $4,483.

The breakeven price ranges in this study to $0.75 at maximum yield of 14,000 per acre and $1.75 at a minimum yield of 6,000 per acre. The minimum wholesale price needed to cover total budgeted costs varied from $1.05 to $0.88 with typical yields between 10,000 to 12,000 pints per acre, respectively.

The profitability of a business can be measured by monetary units, percentages, or time that it takes to recover the money invested in the business. Net Present Value (NPV) measures the profitability of a project in monetary values that exceed the profitability desired after recovering all the investment and the Internal Rate of Revenue (IRR) measures the profitability as a percentage.

To analyze the profitability of blueberry production in Tennessee, the average price of the last decade of $1.25 per pint and an estimated yield of 12,000 pints per acre were used. That results in the following outcome (Table 11):

- The break-even point occurs in the 6th year.
- The IRR is highly attractive at 24.09% at a cost of capital of 9.00%.
- The maximum financial exposition (maximum amount of cash outlay until positive cash flows are generated) is $9,515.
- The accumulated present value of net cash flow at the 7th year is $549.
- The blueberry entrepreneur needs to take into consideration that cash flow per acre would be negative until the 3rd year.

5.2 Results for 50% PYO and 50% already-picked scenario

The estimated 50 percent PYO and 50 percent Already picked total gross revenues per acre of mature Tennessee blueberries range from $7,500 at a price of $1.00 for PYO

and $1.50 for Already Picked and a yield of 6,000 pints per acre to $21,000 at a price of $1.00 for PYO and $2.00 for Already Picked and a yield of 14,000 pints per acre (Table 14a). A typical situation is between 10,000 to 12,000 pints per acre and average prices of $1.00 for PYO and 1.80 to $2.00 for Already Picked. In this situation, the total *gross* revenue per acre would vary from $14,000 to $18,000.

The estimated wholesale net revenue per acre of mature Tennessee blueberries ranges from -$857 at a price of $1.00 for PYO and $1.50 for Already Picked and a yield of 6,000 pints per acre to $12,643 at a price of $1.00 for PYO and $2.00 for Already Picked and a yield of 14,000 pints per acre (Table 14B). Again, in a typical situation of yields between 10,000 to 12,000 pints per acre and prices of $1.00 for PYO and $1.80 to $2.00 for Already Picked, the total gross revenue per acre would be from $5,643 to $9,643.

In this analysis we fix the price for PYO to determine the breakeven price ranges varying the price for Already Picked blueberries. The result fluctuates from $0.77 at maximum yield of 14,000 per acre to $1.79 at a minimum yield of 6,000 per acre for the 50 percent of the yield. (Table 14C). When yield is between 10,000 to 12,000 pints per acre, the minimum Already Picked price needed to cover total budgeted costs varies from $1.07 to $0.89, respectively.

To study the profitability of the PYO/AP blueberry production in Tennessee we used the estimated price of $1.00 per pint for PYO and the minimum price for Already Picked of $1.50 and an estimated yield of 12,000 pints per acre. That results in the following outcome (Table 11):

- The break-even point is in the 5th year.
- The IRR is highly attractive at 32.14%.
- The maximum financial exposition is $9,515.
- The accumulated present value of net cash flow after the 7th year is $5,842.
- The blueberry entrepreneur needs to take into consideration that the cash flow per acre would be positive only after the 2nd year.

5.3 Results for 75% PYO and 25% already-picked scenario

When 25 percent of the blueberry crop is sold via PYO and 25 percent already picked, the estimated total gross revenues per acre of mature Tennessee blueberries ranged from $6,750 at a price of $1.00 for PYO and $1.50 Already Picked and a yield of 6,000 pints per acre to $17,500 at a price of $1.00 for PYO and $2.00 for Already Picked and a yield of 14,000 pints per acre (Table 15A). A typical situation is between 10,000 to 12,000 pints per acre and assuming a price of $1.00 for PYO and $1.80 to $2.00 for Already Picked, the total gross revenue per acre would vary from $12,000 to $15,000.

The estimated wholesale net revenue per acre of mature Tennessee blueberries ranges from -$339 at a price of $1.00 for PYO and $1.50 for Already Picked and a yield of 6,000 pints per acre to $10,411 at a price of $1.00 for PYO and $2.00 for Already Picked and a yield of 14,000 pints per acre (Table 15B). In a typical situation yields are 10,000 to 12,000 pints per acre and price $1.00 for PYO and $1.80 to $2.00 for Already Picked. Therefore the total gross revenue per acre would vary from $4,911 to $7,911.

In this analysis we fix the price for PYO to determine the breakeven price ranges while varying the price for Already Picked blueberries. The price ranged from $0.77 at

maximum yield of 14,000 per acre to $1.79 at a minimum yield of 6,000 per acre for the 50 percent of the yield. (Table 15C).

To study the profitability of the 75% PYO / 25% AP scenario we used the estimated price of $1.00 per pint for PYO and the minimum price for Already Picked of $1.50 and an estimated yield of 12,000 pints per acre. That results in the following outcome (Table 11):

- The break-even point is in the 5th year.
- The IRR is highly attractive at 31.02% at a cost of capital of 9.00%.
- The maximum financial exposition is $9,515.
- The accumulated present value of net cash flow at the 7th year is $5,031.
- The blueberry entrepreneur needs to take into consideration that the cash flow per acre would be positive only after the 2nd year.

Chapter 6: Implications

6.1 From this study

This study was undertaken to evaluate the costs and revenues of producing blueberries in Tennessee. A second objective was to determine the marketing options that blueberry producers have in Tennessee. Given that blueberries begin to be harvested in the third year, the study also includes cash flow, breakeven, and sensitivity analyses to help producers that are willing to invest time, capital and management into establishing a well managed acreage of blueberries in Tennessee.

From the assumptions and results of this study it would appear that blueberry production in Tennessee could be a profitable investment with the right varieties, good location, and good management. The future for the blueberry industry in Tennessee seems to be bright as growers have a strategic early season start on the national market and demand for blueberries should increase as health-conscious consumers learn about their high anti-oxidant properties.

6.2 For future research

Another issue which needs additional research is to determine the optimal size for the farm and the effects of the different sizes of blueberry farms on the profitability of this business. Further research could also be done to decrease the cost of the harvest and post-harvest process since it represented approximately 70 percent of total cost over the first ten years of production.

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APPENDICES

TABLES

Table 1. North American blueberry harvest schedule by region.

REGIONS	MONTHS							
South	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	Percentage of U.S. production
Florida	15		15					<1
North Carolina		10		10				7
Louisiana*		15		10				<1
Mississippi*		15		10				<1
Texas*		15		1				<1
Tennessee*			1	7				<1
Arkansas			1	25				3
Georgia			1	18				2

Northeast	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	%
New Jersey			10		30			16
New York*				1		1		<1
Maine					1	5		32
Massachusets				5		25		<1

Midwest	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	%
Michigan				10			5	30
Indiana*			15			1		<1
New York				10			5	<1

West	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	%
Washington				5			5	3
Oregon				5		10		7

Canada	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	Percentage of Canada production
British Columbia				15		10		83
Quebec					10	15		12
Nova Scotia					15	10		3
Newfoundland						5		2

*Source: United States Highbush blueberry Council (www.ushbc.org/blueberry.htm)

** Personal consultation with Dr. David Lockwood, Plant Science Extension. The University of Tennessee, January 2004

Table 2. Machinery and equipment costs used for blueberry production in Tennessee.

Machinery	Unit variable cost	Unit fixed cost
Sprayer 28'	1.13	0.39
Subsoiler	3.04	1.04
Rotovator	7.12	13.04
Spreader	2.31	0.64
Tank & Wagon	1.20	2.12
Trailer water	7.68	2.03
Bed Shaper	3.93	1.41
Rotary mower	4.56	1.67
Cultivator	1.18	1.73
Disk Harrow	2.56	0.88
Tractor	3.82	4.90
Soil conditioner	0.80	3.11
Pruner	0.25	0.50
Soil test probe	0.05	0.50
Irrigation	2.25	4.68
Grain drill	1.62	8.56

Source: Mississippi State University Budget Generator

Table 3. Labor costs used for blueberry production in Tennessee.

Labor	Unit variable cost
Soil test	9.00
Sulfur (applied)	9.00
Subsoiler	9.00
Disk harrow	9.00
Soil conditioner	9.00
Construct beds	9.00
Prune and Plant	9.00
Spot spray for weeds	9.00
Replant	9.00
Dragging	9.00
Irrigation	9.00
Fertilizer	9.00
Mulch	9.00
Cultivation	9.00
Remove flowers	9.00
Seed grass	9.00
Organic matter	9.00
Mow between rows	9.00
Fungicide spray	12.00
Insecticide spray	12.00
Herbicide spray	12.00

Source: Mississippi State University Budget Generator

Table 4. Fertilizer, herbicide and insecticide costs used for blueberry production in Tennessee.

Materials	Units	Unit variable cost
Sulfur	Lbs	0.27
Round up	2 Pints	16.38
10-10-10.	Lbs	0.07
Plants	Plants	2.65
Gallery 75DF	Lbs	144.64
Compost/bark	cu.yd	15.00
Liquid lime sulfur	Gal	13.52
Malathion 57EC	Pints	6.08
Soil test	Unit	6.00
Sevin XLR	Lbs	6.21
Seed	Lbs	2.00
Devrinol WDG	Lbs	8.71
Ammonium sulfate	Lbs	0.18
Princep 4L	Gal	18.16
Surflan 4AS	Qt	19.32
Solicam WDG	Lbs	17.65
Clamshell	Each	0.16

Source: Mississippi State University Budget Generator

Table 5. Estimated yields by year of blueberry production in Tennessee.

Production	Pint/acre	Tennessee
Year 0	0.00	0%
Year 1	0.00	0%
Year 2	0.00	0%
Year 3	2000.00	17%
Year 4	6000.00	50%
Year 5	9960.00	83%
Year 6	12000.00	100%
Year 7	12000.00	100%
Year 8	12000.00	100%
Year 9	12000.00	100%
Year 10	12000.00	100%
Year 11	12000.00	100%
Year 12	12000.00	100%
Year 13	12000.00	100%
Year 14	12000.00	100%
Year 15	12000.00	100%

Source: Mississippi State University Budget Generator

Table 6. Relation between plant spacing and number of plants per acre.

Plant spacing (ft)	**Plants per acre**
5 x 14	622
6 x 10	726
6 x 12	605
6 x 14	518

Table 7. Season-average grower prices for blueberries, 1993-2002.

STATE	YEARS									
Alabama										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	160	460	460	300	470	310	310	300	310	280
Yield per acre	300	1260	1300	1300	1400	1610	2100	1500	1710	1430
Utilization - Fresh (1000 Lb)	45	460	560	390	650	480	560	450	530	400
Grower price - Fresh	0.99	0.82	0.78	0.88	0.91	1.28	1.06	0.95	0.91	0.94
Utilization - Processed (1000 Lb)	3	120	40	0	10	20	90	N/A	N/A	N/A
Grower price - Processed	0.55	0.51	0.50	0.50	0.55	0.80	0.87	N/A	N/A	N/A
Arkansas										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	700	700	700	600	550	500	450	400	400	450
Yield per acre	2860	2430	2430	1670	3000	1800	2510	2650	2030	2960
Utilization - Fresh (1000 Lb)	1900	1600	1500	800	1350	800	1030	1060	810	1330
Grower price - Fresh	0.98	0.99	1.10	1.60	1.07	1.06	1.08	1.19	1.45	1.15
Utilization - Processed (1000 Lb)	100	100	200	200	300	100	100	N/A	N/A	N/A
Grower price - Processed	0.55	0.51	0.50	0.50	0.55	0.80	0.87	N/A	N/A	N/A
Florida										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	1000	1300	1300	1300	1200	1200	1200	1400	1400	1600
Yield per acre	1000	2310	1920	1770	1670	1670	1210	2000	2210	1810
Utilization - Fresh (1000 Lb)	500	2300	2000	1800	1600	1600	1200	2300	2800	2900
Grower price - Fresh	2.20	2.20	2.30	2.55	2.95	3.75	5.70	5.00	4.30	6.40
Utilization - Processed (1000 Lb)	500	700	500	500	400	400	250	500	300	N/A
Grower price - Processed	0.40	0.90	0.90	0.75	0.80	0.60	0.70	0.85	0.65	N/A
Georgia										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	3700	3700	3700	3500	4000	4400	4400	4600	4600	4500
Yield per acre	1490	2030	3510	1570	3250	1700	2500	4130	3700	3780
Utilization - Fresh (1000 Lb)	1500	2000	5000	2000	4000	4000	6000	6000	6000	8000
Grower price - Fresh	1.02	1.10	0.96	1.21	1.14	0.98	1.18	1.45	1.25	1.57
Utilization - Processed (1000 Lb)	4000	5500	8000	35000	9000	3500	5000	13000	11000	9000
Grower price - Processed	0.27	0.35	0.37	0.57	0.53	0.53	0.60	0.75	0.55	0.54

Table 7. Continued

STATE	YEARS									
Indiana										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	830	830	830	800	800	790	770	720	670	650
Yield per acre	3370	3250	4580	3500	4380	3920	3640	3470	2240	4620
Utilization - Fresh (1000 Lb)	1400	1700	2000	1700	2200	2000	2000	1500	900	1500
Grower price - Fresh	0.70	0.86	0.87	0.95	1.00	1.05	1.06	1.11	1.30	1.22
Utilization - Processed (1000 Lb)	1400	1000	1800	1100	1300	1100	800	1000	600	1500
Grower price - Processed	0.26	0.38	0.39	0.77	0.60	057	0.59	0.80	0.75	0.62
Maine										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Yield per acre	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Utilization - Fresh (1000 Lb)	NA	NA	NA	NA	NA	360	300	420	350	350
Grower price - Fresh	NA	NA	NA	NA	NA	1,00	1,10	1,20	1,40	1,40
Utilization - Processed (1000 Lb)	64212	59145	65639	58930	73540	62621	65802	110570	75200	62000
Grower price - Processed	0.28	0.30	0.32	0.57	0.43	0.46	0.51	0.40	0.30	0.30
Michigan										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	15500	15500	16300	16500	16500	16400	16600	16700	17400	16900
Yield per acre	5610	3030	4110	2550	4360	2990	4220	3710	4430	3790
Utilization - Fresh (1000 Lb)	19000	15000	19000	15000	19000	16000	18000	19000	22000	22000
Grower price - Fresh	0.75	0.74	0.75	1.00	0.98	0.86	1.13	1.25	1.09	1.21
Utilization - Processed (1000 Lb)	68000	32000	48000	27000	53000	33000	52000	43000	49000	42000
Grower price - Processed	0.30	0.44	0.40	0.79	0.59	0.50	0.66	0.73	0.55	0.61
New Jersey										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	8100	7600	7600	7500	7400	7500	7500	7500	7400	7400
Yield per acre	3890	4140	4610	4530	4590	4800	5200	4530	5000	5680
Utilization - Fresh (1000 Lb)	24000	21000	25000	23000	24000	28000	28000	24000	29000	37000
Grower price - Fresh	0.87	0.86	0.88	1.00	1.02	0.87	1.02	1.15	1.09	1.17
Utilization - Processed (1000 Lb)	7500	10500	10000	11000	10000	8000	11000	10000	8000	5000
Grower price - Processed	0.55	0.49	0.45	0.91	0.95	0.50	0.73	0.85	0.64	0.70

Table 7. Continued

STATE	YEARS									
New York										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	560	660	600	650	700	700	700	700	700	700
Yield per acre	3000	1970	1830	1820	2140	2140	2290	2710	2140	2710
Utilization - Fresh (1000 Lb)	1680	1300	900	1100	1400	1300	1500	1800	1450	1800
Grower price - Fresh	0.98	1.08	1.04	1.04	1.08	1.04	1.11	0.97	1.20	1.38
Utilization - Processed (1000 Lb)	NA	NA	200	100	100	200	100	100	50	100
Grower price - Processed	NA	NA	0.84	0.85	0.90	0.92	0.68	0.70	0.50	0.66
North Carolina										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	2900	3000	3200	3200	3250	3000	3200	3600	2700	3700
Yield per acre	5170	5000	4380	3440	2650	4730	4060	4860	5000	4190
Utilization - Fresh (1000 Lb)	11000	12000	11000	9000	6600	10800	10000	10500	10500	11300
Grower price - Fresh	1.09	1.05	1.05	1.09	1.35	1.09	1.19	1.30	1.64	1.76
Utilization - Processed (1000 Lb)	4000	3000	3000	2000	2000	34000	3000	7000	3000	4200
Grower price - Processed	0.34	0.42	0.39	0.67	0.59	0.35	0.51	0.64	0.56	0.63
Oregon										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	1850	1950	1950	2100	2500	2500	2600	2700	2800	2800
Yield per acre	7840	8970	7180	8100	8400	9200	8650	10400	10300	9820
Utilization - Fresh (1000 Lb)	6500	8000	6000	6000	6500	8000	7500	9000	10900	11000
Grower price - Fresh	0.80	0.73	0.71	0.92	0.87	0.72	1.05	0.91	0.82	0.82
Utilization - Processed (1000 Lb)	8000	9500	8000	11000	14500	15000	15000	19000	18000	16500
Grower price - Processed	0.34	0.34	0.33	0.65	0.67	0.38	0.67	0.70	0.38	0.55
Washington										
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Acreage harvested	1200	1400	1400	1300	1300	1500	1600	1700	2000	2000
Yield per acre	5600	6200	4500	6300	6700	7000	6800	7300	7500	6500
Utilization - Fresh (1000 Lb)	2020	2680	1800	1590	2000	2000	1500	2300	4200	2200
Grower price - Fresh	0.78	0.62	0.77	0.89	1.67	1.03	1.22	1.17	1.42	1.22
Utilization - Processed (1000 Lb)	4700	6000	4500	6600	6710	8500	9380	10110	10800	10800
Grower price - Processed	0.39	0.42	0.38	0.64	0.66	0.53	0.64	0.66	0.53	0.58

Source: Economic research service (E.R.S.) U.S. Department of Agriculture "Fruit and Tree Nuts Situation" Outlook Yearbook/FTS-2003/October 2003 http://www.ers.usda.gov/publications/FTS/Yearbook02/fts2002.pdf

Table 8. Cultural practices and associated costs of producing one acre of blueberries in Tennessee. (a) Year 0 soil preparation

	LABOR				MACHINERY AND EQUIPMENT						MATERIALS					TOTALS		
OPERATION	Times Over	Labor (Hr)	Wage Rate	Cost per acre	EQUIPMENT	Times Over	Unit Variable Cost	Equip Variable Costs	Unit Fixed Costs	Total Fixed Costs	ITEMS	Qt	Units	Cost per Unit	Cost per acre	Total variable cost	Total Fixed cost	Total Cost
Soil test	2	0.60	$9.00	$10.80	Soil test probe	2	$0.05	$0.10	$0.50	$1.00	Soil test	2		$6.00	$12.00	$22.85	$1.00	$23.85
Apply elemental sulfur	1	0.20	$9.00	$1.80	Spreader	1	$2.31	$2.31	$0.64	$0.64	Sulfur	650	Lbs	$0.27	$175.50	$179.61	$0.64	$180.25
Spray for weeds	1	0.08	$12.00	$0.96	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$18.47	$0.39	$18.86
Subsoil to mark rows	1	0.16	$9.00	$1.44	Subsoiler	1	$3.04	$3.04	$1.04	$1.04						$4.48	$1.04	$5.52
Disk	2	0.20	$9.00	$3.60	Disk	2	$2.56	$5.12	$0.88	$1.76						$6.16	$1.76	$7.92
Add organic matter	1	16.00	$9.00	$144.00	Trailer	1	$7.68	$7.68	$2.03	$2.03	Compost/bark	269	cu.yd	$15.00	$4,035.00	$4,186.68	$2.03	$4,188.71
Mix in organic matter	2	0.26	$9.00	$4.68	Rotovator	2	$7.12	$14.24	$13.04	$26.08						$11.80	$26.08	$37.88
Construct beds	1	0.28	$9.00	$2.52	Bed shaper	1	$3.93	$3.93	$1.41	$1.41						$6.45	$1.41	$7.86
Overseed grass in middles	1	0.18	$9.00	$1.62	Grain Drill	1	$1.62	$1.62	$8.56	$8.56	Seed	10	Lbs	$2.00	$20.00	$23.24	$8.56	$31.80
Apply fertilizer	1	0.40	$9.00	$3.60	Spreader	1	$2.31	$2.31	$0.64	$0.64	10-10-10.	800	Lbs	$0.07	$56.00	$61.91	$0.64	$62.55
Interest on operating capital for 1/2 year			9.00%															$203.47
TOTAL COST																		
Total Costs		$18.36		$175.02											$4,314.88	$4,492.76		-$4,768.67
TOTAL REVENUE																		
Total Revenue (Harvesting)																		$0.00
PROFIT																		-$4,768.67

[4] May not be needed. It would depend on weed population after the soil preparation year.

Table 8. Continued. (b) Year 1; planting year.

	LABOR				MACHINERY AND EQUIPMENT						MATERIALS					TOTALS		
OPERATION	Times Over	Labor (Hr)	Wage Rate	Cost per acre	EQUIPMENT	Times Over	Unit Variable Cost	Equip Variable Costs	Unit Fixed Costs	Equip Fixed Costs	ITEMS	Qt	Units	Cost per unit	Cost per acre	Total variable costs	Total fixed costs	Total Cost
February-March																		
Soil test	1	0.60	$9.00	$5.40	Soil test probe	1	$0.05	$0.05	$0.50	$0.50	Soil test	1		$6.00	$6.00	$11.45	$0.50	$11.95
Herbicide burndown in rows [z]	1	0.80	$12.00	$9.60	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$27.11	$0.39	$27.50
Prune and plant; water in '6' in rows, 12' between rows	1	24.00	$9.00	$216.00	tank wagon	1	$1.20	$1.20	$2.12	$2.12	Plants [y]	605	Plants	$2.65	$1,603.25	$1,819.25 $1.20	$0.00 $2.12	$1,819.25 $3.32
Set up irrigation system	1	6.00	$9.00	$54.00												$54.00	$0.00	$54.00
Remove flowers	1	6.00	$9.00	$54.00												$54.00	$0.00	$54.00
April																		
Irrigate and check emitters	2	0.25	$9.00	$4.50	Irrigation	2	$2.25	$4.50	$4.68	$9.36						$9.00	$9.36	$18.36
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Fertilize	1	1.50	$9.00	$13.50	Spreader	1	$2.31	$2.31	$0.64	$0.64	Ammonium sulfate	61	Lbs	$0.18	$10.98	$26.79	$0.64	$27.43
May																		
Fertilize again 6 weeks after planting	1	1.50	$9.00	$13.50	Spreader	1	$2.31	$2.31	$0.64	$0.64	Ammonium sulfate	61	Lbs	$0.18	$10.98	$26.79	$0.64	$27.43
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Prune [x]	1	2.00	$9.00	$18.00												$18.00	$0.00	$18.00
June																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Apply insecticide (Japanese beetle)	4	0.80	$12.00	$38.40	Sprayer	4	$1.13	$4.52	$0.39	$1.56	Sevin XLR	2	Lbs	$6.21	$12.42	$55.34	$1.56	$56.90
July																		
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
August																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
September																		
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
October																		
Fall herbicide(pre-emergence)	1	0.80	$12.00	$9.60	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Devrinol WDG Princep 4L	4 0.5	Lbs gallon	$8.71 $18.16	$34.84 $9.08	$45.57 $9.08	$0.39 $0.00	$45.96 $9.08
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Interest on operating capital for 1/2 year			9.00%															$109.61
TOTAL COST																		
Total Costs		$50.78		$571.55			$55.71	$122.46		$134.59					$1,747.07	$2,435.68		-$2,691.83
TOTAL REVENUE																		
Total Revenue (Harvesting)																		$0.00
PROFIT																		-$2,691.83

[z] May not be needed. It would depend on weed population after the soil preparation year.

[y] Assumes that the producer does not produce their own plants; 6' x 12' plant spacing.

[x] Remove fruit from the missed flowers.

Table 8. Continued. (c) Year 2; 1st year after planting.

	LABOR				MACHINERY AND EQUIPMENT						MATERIALS					TOTALS		
OPERATION	Times Over	Labor (Hr)	Wage Rate	Cost per acre	EQUIPMENT	Times Over	Unit Variable Cost	Equip Variable Costs	Unit Fixed Costs	Equip Fixed Costs	ITEMS	Qt	Units	Cost per unit	Cost per acre	Total variable cost	Total fixed costs	Total Cost
March																		
Soil test	1	0.60	$9.00	$5.40	Soil test probe	1	$0.05	$0.05	$0.50	$0.50	Soil test	1		$6.00	$6.00	$11.45	$0.50	$11.95
Pruning	20	2.00	$9.00	$18.00	Pruner	20	$0.25	$5.00	$0.50	$10.00						$23.00	$10.00	$33.00
Add organic matter	1	16.00	$9.00	$144.00	Trailer	1	$7.68	$7.68	$2.03	$2.03	Compost/bark	68	cu.yd	$15.00	$1,012.50	$1,164.18	$2.03	$1,166.21
Replant	1	2.00	$9.00	$18.00	Tank & wagon	1	$1.20	$1.20	$2.12	$2.12	Plants	15	plants	$2.65	$39.75	$58.95	$2.12	$61.07
Herbicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Princep 4L	1	gallon	$18.16	$18.16	$25.29	$0.39	$25.68
Fungicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Liquid lime sulfur	5	gallon	$13.52	$67.60	$74.73	$0.39	$75.12
April																		
Irrigate and check emitters	2	0.25	$9.00	$4.50	Irrigation	2	$2.25	$4.50	$4.68	$9.36						$9.00	$9.36	$18.36
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
May																		
Fertilize 6 weeks after Replanting	1	1.50	$9.00	$13.50	Spreader	1	$2.31	$2.31	$0.64	$0.64	Ammonium sulfate	61	Lbs	$0.18	$10.98	$26.79	$0.64	$27.43
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Remove flowers	1	6.00	$9.00	$54.00												$54.00	$0.00	$54.00
June																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
July																		
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Apply insecticide (Japanese beetle)	4	0.80	$12.00	$38.40	Sprayer	4	$1.13	$4.52	$0.39	$1.56	Sevin XLR	2	Lbs	$6.21	$12.42	$55.34	$1.56	$56.90
August																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
September																		
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
October																		
Fall herbicide (pre-emergence)	1	0.80	$12.00	$9.60	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Princep 4L	0.5	gallon	$18.16	$9.08	$19.81	$0.39	$20.20
											Solicam WDG	1.0	Lbs	$17.65	$17.65	$17.65	$0.00	$17.65
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Interest on operating capital for 1/2 year			9.00%															$78.26
TOTAL COST																		
Total Costs		$36.12		$452.45			$54.52	$116.96		$128.60					$1,210.55	$1,752.58		-$2,054.87
TOTAL REVENUE																		
Total Revenue																		$0.00
PROFIT																		-$2,054.87

Table 8. Continued. (d) Year 3; 2nd year after planting.

	LABOR				MACHINERY AND EQUIPMENT						MATERIALS					TOTALS		
OPERATION	Times Over	Labor (Hr)	Wage Rate	Cost per acre	EQUIPMENT	Times Over	Unit Variable Cost	Equip Variable Costs	Unit Fixed Costs	Equip Fixed Costs	ITEMS	Qt	Units	Cost per unit	Cost per acre	Total variable cost	Total fixed costs	Total Cost
March																		
Soil test	1	0.60	$9.00	$5.40	Soil test probe	1	$0.05	$0.05	$0.50	$0.50	Soil test	1		$6.00	$6.00	$11.45	$0.50	$11.95
Pruning	20	6.00	$9.00	$54.00	Pruner	20	$0.25	$5.00	$0.50	$10.00						$59.00	$10.00	$69.00
Herbicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Princep 4L	1	gallon	$18.16	$18.16	$25.29	$0.39	$25.68
Fungicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Liquid lime sulfur	5	gallon	$13.52	$67.60	$74.73	$0.39	$75.12
April																		
Irrigate and check emitters	2	0.25	$9.00	$4.50	Irrigation	2	$2.25	$4.50	$4.68	$9.36						$9.00	$9.36	$18.36
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
May																		
Fertilize	1	1.50	$9.00	$13.50	Spreader	1	$2.31	$2.31	$0.64	$0.64	Ammonium Sulfate	61	Lbs	$0.18	$10.98	$26.79	$0.64	$27.43
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Pollination [z]											Bumblebees							
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
June																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
July																		
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Apply insecticide (Japanese beetle)	4	0.80	$12.00	$38.40	Sprayer	4	$1.13	$4.52	$0.39	$1.56	Sevin XLR	2	Lbs	$6.21	$12.42	$55.34	$1.56	$56.90
August																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
September																		
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
October																		
Fall herbicide (pre-emergence)	1	0.80	$12.00	$9.60	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Devrinol WDG	4	Lbs	$8.71	$34.84	$45.57	$0.39	$45.96
											Surflan 4AS	2.0	quart	$19.32	$38.64	$38.64	$0.00	$38.64
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Interest on operating capital for 1/2 year			9.00%															$28.08
HARVEST AND POST-HARVEST COSTS																		
Plastic clamshell containers with pad											Clamshells	2,000	each	$0.16	$320.00	$320.00		$320.00
Harvest (labor for picking)		$80.00	$9.00	$720.00												$720.00		$720.00
Refrigeration - 8' by 8' by 9' unit									$341.00	$341.00	Electricity	30	days	$1.19	$35.70	$35.70		$376.70
Marketing (wholesale)												2,000	pints	$0.16	$312.50	$312.50		$312.50
TOTAL COST																		
Total Costs		$18.08		$992.45			$53.63	$125.13		$483.72					$905.98	$2,023.56		-$2,535.36
TOTAL REVENUE																		
Total Revenue																		$2,500.00 [1]
PROFIT																		-$35.36

[z] Beehive rental is not usually performed in Tennessee since native bumblebees are considered better pollinators than bees.

[1] Revenue from $ 12,000 pints valued at $ 1.25 per pint, marketed through wholesale channels.

Table 8. Continued. (e) Year 4; 3rd year after planting.

	LABOR				MACHINERY AND EQUIPMENT						MATERIALS					TOTALS		
OPERATION	Times Over	Labor (Hr)	Wage Rate	Cost per acre	EQUIPMENT	Times Over	Unit Variable Cost	Equip Variable Costs	Unit Fixed Costs	Equip Fixed Costs	ITEMS	Qt	Units	Cost per unit	Cost per acre	Total variable cost	Total fixed costs	Total Cost
March																		
Soil test	1	0.60	$9.00	$5.40	Soil test probe	1	$0.05	$0.05	$0.50	$0.50	Soil test	1		$6.00	$6.00	$11.45	$0.50	$11.95
Pruning	20	6.00	$9.00	$54.00	Pruner	20	$0.25	$5.00	$0.50	$10.00						$59.00	$10.00	$69.00
Add organic matter	1	16.00	$9.00	$144.00	Trailer	1	$7.68	$7.68	$2.03	$2.03	Compost/bark	68	cu.yd	$15.00	$1,012.50	$1,164.18	$2.03	$1,166.21
Herbicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Princep 4L	1	gallon	$18.16	$18.16	$25.29	$0.39	$25.68
Fungicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Liquid lime sulfur	5	gallon	$13.52	$67.60	$74.73	$0.39	$75.12
April																		
Irrigate and check emitters	2	0.25	$9.00	$4.50	Irrigation	2	$2.25	$4.50	$4.68	$9.36						$9.00	$9.36	$18.36
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
May																		
Fertilize	1	1.50	$9.00	$13.50	Spreader	1	$2.31	$2.31	$0.64	$0.64	Ammonium sulfate	61	Lbs	$0.18	$10.98	$26.79	$0.64	$27.43
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Pollination [Z]											Bumblebees							
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
June																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
July																		
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Apply insecticide (Japanese beetle)	4	0.80	$12.00	$38.40	Sprayer	4	$1.13	$4.52	$0.39	$1.56	Sevin XLR	2	Lbs	$6.21	$12.42	$55.34	$1.56	$56.90
August																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
September																		
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
October																		
Fall herbicide (pre-emergence)	1	0.80	$12.00	$9.60	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Devrinol WDG	4	Lbs	$8.71	$34.84	$45.57	$0.39	$45.96
											Princep 4L	0.5	gallon	$18.16	$9.08	$9.08	$0.00	$9.08
Irrigate and check emitters	1	0.25	$9.00	$2.25	Irrigation	1	$2.25	$2.25	$4.68	$4.68						$4.50	$4.68	$9.18
Interest on operating capital for 1/2 year			9.00%															$76.07
HARVEST AND POST-HARVEST COSTS																		
Plastic clamshell containers with pad											Clamshells	6,000	each	$0.16	$960.00	$960.00		$960.00
Harvest (labor for picking)		$240.00	$9.00	$2,160.00												$2,160.00		$2,160.00
Refrigeration - 8' by 8' by 9' unit									$341.00	$341.00	Electricity	30	days	$1.19	$35.70	$35.70		$376.70
Marketing (wholesale)												6,000	pints	$0.16	$937.50	$937.50		$937.50
TOTAL COST																		
Total Costs		$32.43		$2,571.95			$57.88	$124.88		$470.82					$3,104.00	$5,783.58		-$6,406.64
TOTAL REVENUE																		
Total Revenue																		$7,500.00 [Y]
PROFIT																		$1,093.36

[Z] Beehive rental is not usually performed in Tennessee since native bumblebees are considered better pollinators than bees.

[Y] Revenue from $ 12,000 pints valued at $ 1.25 per pint, marketed through wholesale channels.

Table 8. Continued. (f) Year 5; 4th year after planting.

	LABOR				MACHINERY AND EQUIPMENT						MATERIALS					TOTALS		
OPERATION	Times Over	Labor (Hr)	Wage Rate	Cost per acre	EQUIPMENT	Times Over	Unit Variable Cost	Equip Variable Costs	Unit Fixed Costs	Equip Fixed Costs	ITEMS	Qt	Units	Cost per unit	Cost per acre	Total variable cost	Total fixed costs	Total Cost
March																		
Soil test	1	0.60	$9.00	$5.40	Soil test probe	1	$0.05	$0.05	$0.50	$0.50	Soil test	1		$6.00	$6.00	$11.45	$0.50	$11.95
Pruning	20	6.00	$9.00	$54.00	Pruner	20	$0.25	$5.00	$0.50	$10.00						$59.00	$10.00	$69.00
Herbicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Princep 4L	1	gallon	$18.16	$18.16	$25.29	$0.39	$25.68
Fungicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Liquid lime sulfur	5	gallon	$13.52	$67.60	$74.73	$0.39	$75.12
April																		
Irrigate and check emitters	2	0.25	$9.00	$4.50	Irrigation	2	$2.25	$4.50	$4.68	$9.36						$9.00	$9.36	$18.36
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
May																		
Fertilize	1	1.50	$9.00	$13.50	Spreader	1	$2.31	$2.31	$0.64	$0.64	Ammonium sulfate	61	Lbs	$0.18	$10.98	$26.79	$0.64	$27.43
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Pollination [z]											Bumblebees							
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
June																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
July																		
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Apply insecticide (Japanese beetle)	4	0.80	$12.00	$38.40	Sprayer	4	$1.13	$4.52	$0.39	$1.56	Sevin XLR	2	Lbs	$6.21	$12.42	$55.34	$1.56	$56.90
August																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
September																		
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
October																		
Fall herbicide (pre-emergence)	1	0.80	$12.00	$9.60	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Princep 4L	0.5	gallon	$18.16	$9.08	$19.81	$0.39	$20.20
											Solicam WDG	1.0	Lbs	$17.65	$17.65	$17.65	$0.00	$17.65
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Interest on operating capital for 1/2 year			9.00%															$25.97
HARVEST AND POST-HARVEST COSTS																		
Plastic clamshell containers with pad											Clamshells	9,960	each	$0.16	$1,593.60	$1,593.60		$1,593.60
Harvest (labor for picking)		$398.40	$9.00	$3,585.60												$3,585.60		$3,585.60
Refrigeration - 8' by 8' by 9' unit									$341.00	$341.00	Electricity	30	days	$1.19	$35.70	$35.70		$376.70
Marketing (wholesale)													pints	$0.16	$1,556.25	$1,556.25		$1,556.25
TOTAL COST																		
Total Costs		$17.48		$3,858.05			$53.58	$125.08		$483.22					$3,370.58	$7,348.31		-$7,869.46
TOTAL REVENUE																		
Total Revenue																		$12,450.00 [y]
PROFIT																		$4,580.54

[z] Beehive rental is not usually performed in Tennessee since native bumblebees are considered better pollinators than bees.

[y] Revenue from $ 12,000 pints valued at $ 1.25 per pint, marketed through wholesale channels.

Table 8. Continued. (g) Year 6; 5th year after planting.

	LABOR				MACHINERY AND EQUIPMENT						MATERIALS					TOTALS		
OPERATION	Times Over	Labor (Hr)	Wage Rate	Cost per acre	EQUIPMENT	Times Over	Unit Variable Cost	Equip Variable Costs	Unit Fixed Costs	Equip Fixed Costs	ITEMS	Qt	Units	Cost per unit	Cost per acre	Total variable cost	Total fixed costs	Total Cost
March																		
Soil test	1	0.60	$9.00	$5.40	Soil test probe	1	$0.05	$0.05	$0.50	$0.50	Soil test	1		$6.00	$6.00	$11.45	$0.50	$11.95
Pruning	20	6.00	$9.00	$54.00	Pruner	20	$0.25	$5.00	$0.50	$10.00						$59.00	$10.00	$69.00
Add organic matter	1	16.00	$9.00	$144.00	Trailer	1	$7.68	$7.68	$2.03	$2.03	Compost/bark	68	cu.yd	$15.00	$1,012.50	$1,164.18	$2.03	$1,166.21
Herbicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Princep 4L	1	gallon	$18.16	$18.16	$25.29	$0.39	$25.68
Fungicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Liquid lime sulfur	5	gallon	$13.52	$67.60	$74.73	$0.39	$75.12
April																		
Irrigate and check emitters	2	0.25	$9.00	$4.50	Irrigation	2	$2.25	$4.50	$4.68	$9.36						$9.00	$9.36	$18.36
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
May																		
Fertilize	1	1.50	$9.00	$13.50	Spreader	1	$2.31	$2.31	$0.64	$0.64	Ammonium sulfate	61	Lbs	$0.18	$10.98	$26.79	$0.64	$27.43
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Pollination [Z]											Bumblebees							
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
June																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
July																		
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Apply insecticide (Japanese beetle)	4	0.80	$12.00	$38.40	Sprayer	4	$1.13	$4.52	$0.39	$1.56	Sevin XLR	2	Lbs	$6.21	$12.42	$55.34	$1.56	$56.90
August																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
September																		
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
October																		
Fall herbicide (pre-emergence)	1	0.80	$12.00	$9.60	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Devrinol WDG	4	Lbs	$8.71	$34.84	$45.57	$0.39	$45.96
											Surflan 4 AS	2.0	quart	$19.32	$38.64	$38.64	$0.00	$38.64
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Interest on operating capital for 1/2 year			9.00%															$80.98
HARVEST AND POST-HARVEST COSTS																		
Plastic clamshell containers with pad											Clamshells	12,000	each	$0.16	$1,920.00	$1,920.00		$1,920.00
Harvest (labor for picking)		$480.00	$9.00	$4,320.00												$4,320.00		$4,320.00
Refrigeration - 8' by 8' by 9' unit									$341.00	$341.00	Electricity	30	days	$1.19	$35.70	$35.70		$376.70
Marketing (wholesale)												12,000	pints	$0.16	$1,875.00	$1,875.00		$1,875.00
TOTAL COST																		
Total Costs		$33.48		$4,736.45			$61.26	$132.76		$485.25					$5,074.98	$9,938.79		**-$10,516.97**
TOTAL REVENUE																		
Total Revenue																		**$15,000.00** [Y]
PROFIT																		**$4,483.03**

[Z] Beehive rental is not usually performed in Tennessee since native bumblebees are considered better pollinators than bees.

[Y] Revenue from $ 12,000 pints valued at $ 1.25 per pint, marketed through wholesale channels.

Table 8. Continued. (h) Year 7; 6th year after planting.

	LABOR				MACHINERY AND EQUIPMENT						MATERIALS					TOTALS		
OPERATION	Times Over	Labor (Hr)	Wage Rate	Cost per acre	EQUIPMENT	Times Over	Unit Variable Cost	Equip Variable Costs	Unit Fixed Costs	Equip Fixed Costs	ITEMS	Qt	Units	Cost per unit	Cost per acre	Total variable cost	Total fixed costs	Total Cost
March																		
Soil test	1	0.60	$9.00	$5.40	Soil test probe	1	$0.05	$0.05	$0.50	$0.50	Soil test	1		$6.00	$6.00	$11.45	$0.50	$11.95
Pruning	20	6.00	$9.00	$54.00	Pruner	20	$0.25	$5.00	$0.50	$10.00						$59.00	$10.00	$69.00
Herbicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Princep 4L	1	gallon	$18.16	$18.16	$25.29	$0.39	$25.68
Fungicide	1	0.50	$12.00	$6.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Liquid lime sulfur	5	gallon	$13.52	$67.60	$74.73	$0.39	$75.12
April																		
Irrigate and check emitters	2	0.25	$9.00	$4.50	Irrigation	2	$2.25	$4.50	$4.68	$9.36						$9.00	$9.36	$18.36
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
May																		
Fertilize	1	1.50	$9.00	$13.50	Spreader	1	$2.31	$2.31	$0.64	$0.64	Ammonium sulfate	61	Lbs	$0.18	$10.98	$26.79	$0.64	$27.43
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Pollination [Z]											Bumblebees							
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
June																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
July																		
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
Apply insecticide (Japanese beetle)	4	0.80	$12.00	$38.40	Sprayer	4	$1.13	$4.52	$0.39	$1.56	SevinXLR	2	Lbs	$6.21	$12.42	$55.34	$1.56	$56.90
August																		
Spot spray for weeds	1	1.00	$9.00	$9.00	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Roundup	1	2 pints	$16.38	$16.38	$26.51	$0.39	$26.90
Irrigate and check emitters	4	0.50	$9.00	$18.00	Irrigation	4	$2.25	$9.00	$4.68	$18.72						$27.00	$18.72	$45.72
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
September																		
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Mow between rows	2	0.31	$9.00	$5.63	Rotary mower 6'	2	$4.56	$9.12	$1.67	$3.34						$14.75	$3.34	$18.09
October																		
Fall herbicide (pre-emergence)	1	0.80	$12.00	$9.60	Sprayer	1	$1.13	$1.13	$0.39	$0.39	Devrinol WDG	4	Lbs	$8.71	$34.84	$45.57	$0.39	$45.96
											Surflan 4AS	2.0	quart	$19.32	$38.64	$38.64	$0.00	$38.64
Irrigate and check emitters	3	0.25	$9.00	$6.75	Irrigation	3	$2.25	$6.75	$4.68	$14.04						$13.50	$14.04	$27.54
Interest on operating capital for 1/2 year			9.00%															$28.59
HARVEST AND POST-HARVEST COSTS																		
Plastic clamshell containers with pad											Clamshells	12,000	each	$0.16	$1,920.00	$1,920.00		$1,920.00
Harvest (labor for picking)		$480.00	$9.00	$4,320.00												$4,320.00		$4,320.00
Refrigeration - 8' by 8' by 9' unit									$341.00	$341.00	Electricity	30	days	$1.19	$35.70	$35.70		$376.70
Marketing (wholesale)												12,000	pints	$0.16	$1,875.00	$1,875.00		$1,875.00
TOTAL COST																		
Total Costs		$17.48		$4,592.45			$53.58	$125.08		$483.22					$4,062.48	$8,774.61		-$9,298.38
TOTAL REVENUE																		
Total Revenue																		$15,000.00 [Y]
PROFIT																		$5,701.62

[1] Beehive rental is not usually performed in Tennessee since native bumblebees are considered better pollinators than bees.

[Y] Revenue from $ 12,000 pints valued at $ 1.25 per pint, marketed through wholesale channels.

Table 9. Summary of blueberry production, harvest, post-harvest and financial cost distribution for the first 10 years of production. (a) wholesale scenario.

	Year 0	%	Year 1	%	Year 2	%	Year 3	%	Year 4	%	Year 5	%	Year 6	%	Year 7	%	Year 8	%	Year 9	%	Year 10	%	Total	%
Plants	$0	0.00	$1,823	0.68	$61	0.03	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$1,884	2%
Rem. Flowers	$0	0.00	$54	0.02	$54	0.03	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$108	0%
Rem. Fruits	$0	0.00	$18	0.01	$0	0.02	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$18	0%
Prune	$0	0.00	$0	0.00	$33	0.00	$69	0.03	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$585	1%
Disk	$8	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$8	0%
Subsoiler	$6	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$6	0%
Const. Beds	$8	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$8	0%
Fertilizer	$63	0.01	$55	0.02	$27	0.01	$27	0.01	$27	0.00	$27	0.00	$27	0.00	$27	0.00	$27	0.00	$27	0.00	$27	0.00	$364	0%
Herbicides	$19	0.00	$83	0.03	$64	0.03	$110	0.04	$81	0.01	$64	0.01	$110	0.01	$110	0.01	$110	0.01	$110	0.01	$110	0.01	$971	1%
Insecticide	$0	0.00	$57	0.02	$57	0.03	$57	0.02	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$569	1%
Fungicides	$0	0.00	$0	0.00	$75	0.04	$75	0.03	$75	0.01	$75	0.01	$75	0.01	$75	0.01	$75	0.01	$75	0.01	$75	0.01	$676	1%
Spot spray	$0	0.00	$81	0.03	$81	0.04	$81	0.03	$81	0.01	$81	0.01	$81	0.01	$81	0.01	$81	0.01	$81	0.01	$81	0.01	$807	1%
Sulfur applic.	$180	0.04	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$180	0%
Soil test	$24	0.01	$12	0.00	$12	0.01	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$143	0%
Mowing	$0	0.00	$109	0.04	$109	0.05	$109	0.04	$109	0.02	$109	0.01	$109	0.01	$109	0.01	$109	0.01	$109	0.01	$109	0.01	$1,086	1%
Seed grass	$32	0.01	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$32	0%
Irrigation	$0	0.00	$292	0.11	$238	0.12	$238	0.09	$220	0.03	$238	0.03	$238	0.02	$238	0.03	$238	0.02	$238	0.03	$238	0.02	$2,417	3%
Mulch	$4,227	0.89	$0	0.00	$1,166	0.57	$0	0.00	$1,166	0.18	$0	0.00	$1,166	0.11	$0	0.00	$1,166	0.11	$0	0.00	$1,166	0.11	**$10,058**	**13%**
Harvest	$0	0.00	$0	0.00	$0	0.00	$720	0.28	$2,160	0.34	$3,586	0.46	$4,320	0.41	$4,320	0.46	$4,320	0.41	$4,320	0.46	$4,320	0.41	**$28,066**	**37%**
Post-harvest	$0	0.00	$0	0.00	$0	0.00	$1,009	0.40	$2,274	0.35	$3,527	0.45	$4,172	0.40	$4,172	0.45	$4,172	0.40	$4,172	0.45	$4,172	0.40	**$27,668**	**36%**
Financial	$203	0.04	$110	0.04	$78	0.04	$28	0.01	$76	0.01	$26	0.00	$81	0.01	$29	0.00	$81	0.01	$29	0.00	$81	0.01	$822	1%
Total costs	$4,769	1.00	$2,692	1.00	$2,055	1.00	$2,535	1.00	$6,407	1.00	$7,869	1.00	$10,517	1.00	$9,298	1.00	$10,517	1.00	$9,298	1.00	$10,517	1.00	**$76,475**	**100%**

Table 9. Continued. (b) 50% PYO / 50% AP.

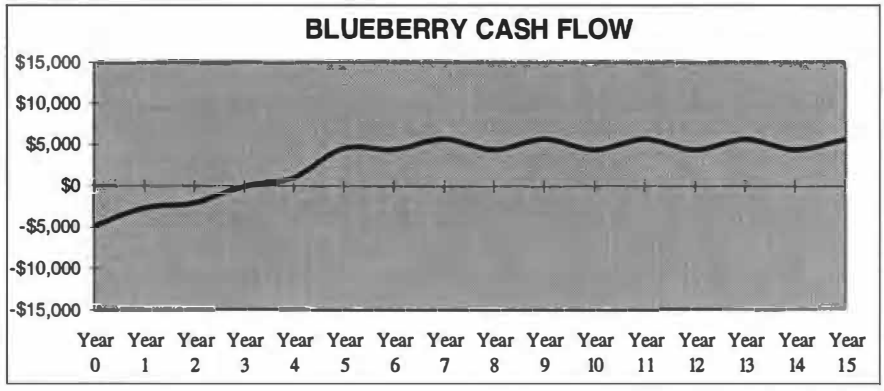
	Year 0	%	Year 1	%	Year 2	%	Year 3	%	Year 4	%	Year 5	%	Year 6	%	Year 7	%	Year 8	%	Year 9	%	Year 10	%	Total	%
Plants	$0	0.00	$1,823	0.68	$61	0.03	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$1,884	0.03
Rem. Flowers	$0	0.00	$54	0.02	$54	0.03	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$108	0.00
Rem. Fruits	$0	0.00	$18	0.01	$0	0.02	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$18	0.00
Prune	$0	0.00	$0	0.00	$33	0.00	$69	0.03	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$585	0.01
Disk	$8	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$8	0.00
Subsoiler	$6	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$6	0.00
Const. Beds	$8	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$8	0.00
Fertilizer	$63	0.01	$55	0.02	$27	0.01	$27	0.01	$27	0.01	$27	0.01	$27	0.00	$27	0.00	$27	0.00	$27	0.00	$27	0.00	$364	0.01
Herbicides	$19	0.00	$83	0.03	$64	0.03	$110	0.06	$81	0.02	$64	0.01	$110	0.02	$110	0.02	$110	0.02	$110	0.02	$110	0.02	$971	0.02
Insecticide	$0	0.00	$57	0.02	$57	0.03	$57	0.03	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$569	0.01
Fungicides	$0	0.00	$0	0.00	$75	0.04	$75	0.04	$75	0.02	$75	0.01	$75	0.01	$75	0.01	$75	0.01	$75	0.01	$75	0.01	$676	0.01
Spot spray	$0	0.00	$81	0.03	$81	0.04	$81	0.04	$81	0.02	$81	0.02	$81	0.01	$81	0.01	$81	0.01	$81	0.01	$81	0.01	$807	0.01
Sulfur applic.	$180	0.04	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$180	0.00
Soil test	$24	0.01	$12	0.00	$12	0.01	$12	0.01	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$143	0.00
Mowing	$0	0.00	$109	0.04	$109	0.05	$109	0.05	$109	0.02	$109	0.02	$109	0.02	$109	0.02	$109	0.02	$109	0.02	$109	0.02	$1,086	0.02
Seed grass	$32	0.01	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$32	0.00
Irrigation	$0	0.00	$292	0.11	$238	0.12	$238	0.12	$220	0.05	$238	0.05	$238	0.03	$238	0.04	$238	0.03	$238	0.04	$238	0.03	$2,417	0.04
Mulch	$4,227	0.89	$0	0.00	$1,166	0.57	$0	0.00	$1,166	0.24	$0	0.00	$1,166	0.16	$0	0.00	$1,166	0.16	$0	0.00	$1,166	0.16	**$10,058**	**0.18**
Harvest	$0	0.00	$0	0.00	$0	0.00	$360	0.18	$1,080	0.23	$1,793	0.35	$2,160	0.30	$2,160	0.36	$2,160	0.30	$2,160	0.36	$2,160	0.30	**$14,033**	**0.25**
Post-harvest	$0	0.00	$0	0.00	$0	0.00	$822	0.41	$1,712	0.36	$2,593	0.50	$3,047	0.42	$3,047	0.51	$3,047	0.42	$3,047	0.51	$3,047	0.42	**$20,360**	**0.37**
Financial	$203	0.04	$110	0.04	$78	0.04	$28	0.01	$76	0.02	$26	0.01	$81	0.01	$29	0.00	$81	0.01	$29	0.00	$81	0.01	$822	0.01
Total costs	$4,769	1.00	$2,692	1.00	$2,055	1.00	$1,988	1.00	$4,764	1.00	$5,143	1.00	$7,232	1.00	$6,013	1.00	$7,232	1.00	$6,013	1.00	$7,232	1.00	**$55,133**	**1.00**

Table 9. Continued. (c) 75% PYO / 25% AP

	Year 0	%	Year 1	%	Year 2	%	Year 3	%	Year 4	%	Year 5	%	Year 6	%	Year 7	%	Year 8	%	Year 9	%	Year 10	%	Total	%
Plants	$0	0.00	$1,823	0.68	$61	0.03	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$1,884	0.04
Rem. Flowers	$0	0.00	$54	0.02	$54	0.03	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$108	0.00
Rem. Fruits	$0	0.00	$18	0.01	$0	0.02	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$18	0.00
Prune	$0	0.00	$0	0.00	$33	0.00	$69	0.04	$69	0.02	$69	0.02	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$69	0.01	$585	0.01
Disk	$8	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$8	0.00
Subsoiler	$6	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$6	0.00
Const. Beds	$8	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$8	0.00
Fertilizer	$63	0.01	$55	0.02	$27	0.01	$27	0.01	$27	0.01	$27	0.01	$27	0.00	$27	0.01	$27	0.00	$27	0.01	$27	0.00	$364	0.01
Herbicides	$19	0.00	$83	0.03	$64	0.03	$110	0.06	$81	0.02	$64	0.01	$110	0.02	$110	0.02	$110	0.02	$110	0.02	$110	0.02	$971	0.02
Insecticide	$0	0.00	$57	0.02	$57	0.03	$57	0.03	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$57	0.01	$569	0.01
Fungicides	$0	0.00	$0	0.00	$75	0.04	$75	0.04	$75	0.02	$75	0.02	$75	0.01	$75	0.01	$75	0.01	$75	0.01	$75	0.01	$676	0.01
Spot spray	$0	0.00	$81	0.03	$81	0.04	$81	0.04	$81	0.02	$81	0.02	$81	0.01	$81	0.02	$81	0.01	$81	0.02	$81	0.01	$807	0.02
Sulfur applic.	$180	0.04	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$180	0.00
Soil test	$24	0.01	$12	0.00	$12	0.01	$12	0.01	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$12	0.00	$143	0.00
Mowing	$0	0.00	$109	0.04	$109	0.05	$109	0.06	$109	0.02	$109	0.02	$109	0.02	$109	0.02	$109	0.02	$109	0.02	$109	0.02	$1,086	0.02
Seed grass	$32	0.01	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$0	0.00	$32	0.00
Irrigation	$0	0.00	$292	0.11	$238	0.12	$238	0.13	$220	0.05	$238	0.05	$238	0.04	$238	0.04	$238	0.04	$238	0.04	$238	0.04	$2,417	0.05
Mulch	$4,227	0.89	$0	0.00	$1,166	0.57	$0	0.00	$1,166	0.26	$0	0.00	$1,166	0.18	$0	0.00	$1,166	0.18	$0	0.00	$1,166	0.18	**$10,058**	**0.20**
Harvest	$0	0.00	$0	0.00	$0	0.00	$180	0.10	$540	0.12	$896	0.20	$1,080	0.17	$1,080	0.20	$1,080	0.17	$1,080	0.20	$1,080	0.17	**$7,016**	**0.14**
Post-harvest	$0	0.00	$0	0.00	$0	0.00	$884	0.47	$1,899	0.43	$2,904	0.64	$3,422	0.52	$3,422	0.64	$3,422	0.52	$3,422	0.64	$3,422	0.52	**$22,796**	**0.45**
Financial	$203	0.04	$110	0.04	$78	0.04	$28	0.02	$76	0.02	$26	0.01	$81	0.01	$29	0.01	$81	0.01	$29	0.01	$81	0.01	$822	0.02
Total costs	$4,769	1.00	$2,692	1.00	$2,055	1.00	$1,870	1.00	$4,412	1.00	$4,558	1.00	$6,527	1.00	$5,308	1.00	$6,527	1.00	$5,308	1.00	$6,527	1.00	**$50,553**	**1.00**

Table 10. Summary of cash flow by year. (a) wholesale scenario.

ITEM / YEAR	0	1	2	3	4	5	6	7
Gross Income	0.00	0.00	0.00	2,500.00	7,500.00	12,450.00	15,000.00	15,000.00
Production costs	(4,565.20)	(2,582.22)	(1,976.61)	(778.08)	(1,896.37)	(731.33)	(1,944.29)	(778.08)
Harvest costs	0.00	0.00	0.00	(720.00)	(2,160.00)	(3,585.60)	(4,320.00)	(4,320.00)
Marketing costs	0.00	0.00	0.00	(1,009.20)	(2,274.20)	(3,526.55)	(4,171.70)	(4,171.70)
Financial costs	(203.47)	(109.61)	(78.26)	(28.08)	(76.07)	(25.97)	(80.98)	(28.59)
Net Cash Flow	(4,768.67)	(2,691.83)	(2,054.87)	(35.36)	1,093.36	4,580.54	4,483.03	5,701.62
Present value of Net Cash Flow	**(4,768.67)**	**(2,469.57)**	**(1,729.55)**	**(27.30)**	**774.56**	**2,977.04**	**2,673.08**	**3,118.98**
Accumulated PV of Net C. Flow	**(4,768.67)**	**(7,238.24)**	**(9,190.05)**	**(9,542.68)**	**(8,776.17)**	**(5,480.34)**	**(1,203.75)**	**3,725.18**



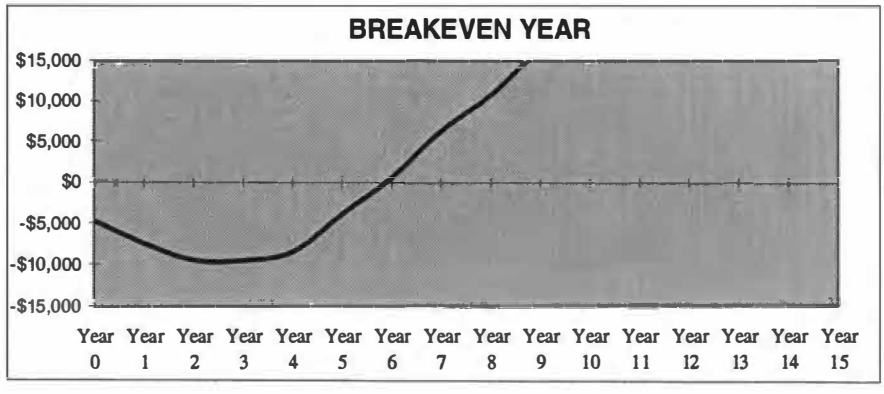
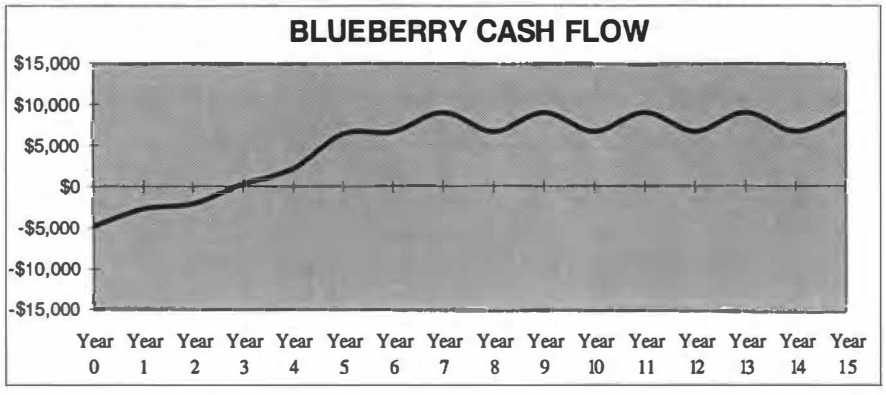


Table 10. Continued. (b) 50% PYO / 50% AP scenario.

ITEM \ YEAR	0	1	2	3	4	5	6	7
Gross Income	0.00	0.00	0.00	2,500.00	7,500.00	12,450.00	15,000.00	15,000.00
Production costs	(4,565.20)	(2,582.22)	(1,976.61)	(965.58)	(2,458.87)	(1,665.08)	(1,944.29)	(778.08)
Harvest costs	0.00	0.00	0.00	(360.00)	(1,080.00)	(1,792.80)	(2,160.00)	(2,160.00)
Marketing costs	0.00	0.00	0.00	(821.70)	(1,711.70)	(2,592.80)	(3,046.70)	(3,046.70)
Financial costs	(203.47)	(109.61)	(78.26)	(28.08)	(76.07)	(25.97)	(80.98)	(28.59)
Net Cash Flow	(4,768.67)	(2,691.83)	(2,054.87)	324.64	2,173.36	6,373.34	6,643.03	8,986.62
Present value of Net Cash Flow	**(4,768.67)**	**(2,469.57)**	**(1,729.55)**	**250.68**	**1,539.66**	**4,142.24**	**3,961.02**	**4,915.99**
Accumulated PV of Net C. Flow	**(4,768.67)**	**(7,238.24)**	**(8,967.79)**	**(8,717.11)**	**(7,177.44)**	**(3,035.21)**	**925.81**	**5,841.80**



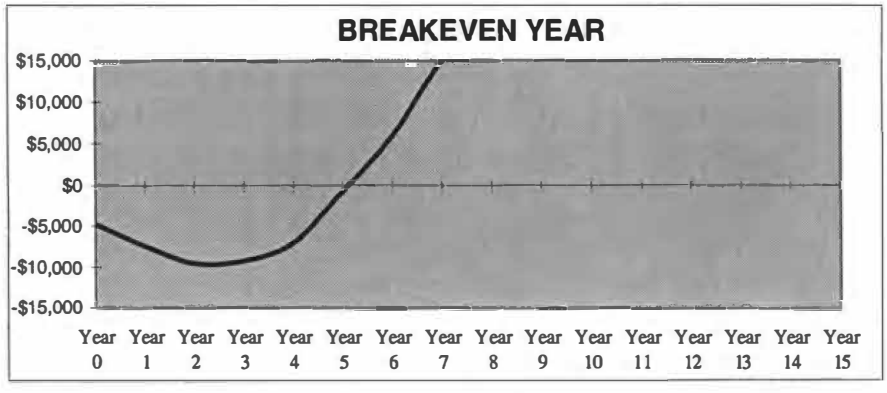
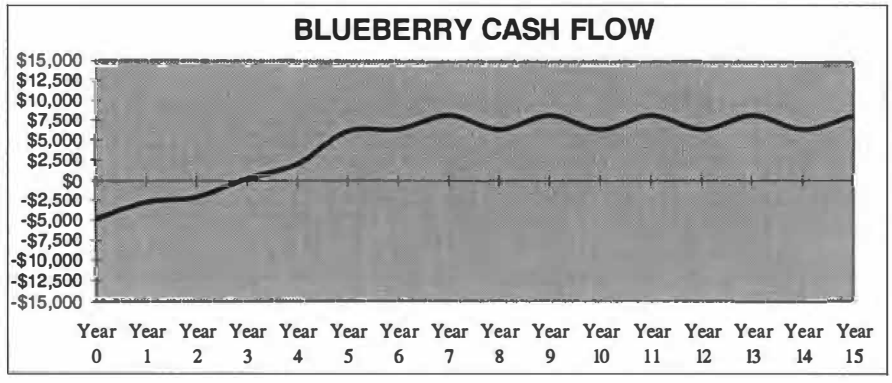


Table 10. Continued. (c) 75% PYO / 25% AP scenario.

ITEM \ YEAR	0	1	2	3	4	5	6	7
Gross Income	0.00	0.00	0.00	2,250.00	6,750.00	11,205.00	13,500.00	13,500.00
Production costs	(4,565.20)	(2,582.22)	(1,976.61)	(871.83)	(2,177.62)	(1,198.21)	(1,944.29)	(778.08)
Harvest costs	0.00	0.00	0.00	(180.00)	(540.00)	(896.40)	(1,080.00)	(1,080.00)
Marketing costs	0.00	0.00	0.00	(884.20)	(1,899.20)	(2,904.05)	(3,421.70)	(3,421.70)
Financial costs	(203.47)	(109.61)	(78.26)	(28.08)	(76.07)	(25.97)	(80.98)	(28.59)
Net Cash Flow	(4,768.67)	(2,691.83)	(2,054.87)	285.89	2,057.11	6,180.37	6,410.53	8,191.62
Present value of Net Cash Flow	**(4,768.67)**	**(2,469.57)**	**(1,729.55)**	**220.76**	**1,457.31**	**4,016.82**	**3,822.39**	**4,481.10**
Accumulated PV of Net C. Flow	(4,768.67)	(7,238.24)	(8,967.79)	(8,747.03)	(7,289.72)	(3,272.91)	549.48	5,030.58



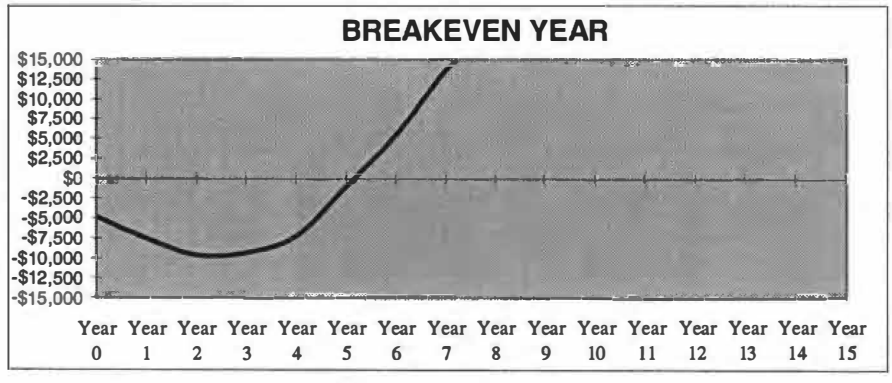


Table 11. Estimated total gross revenues per acre of mature TN blueberries at selected prices and yields, wholesale scenario.

Price \ Yield	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000
$0.80	$4,800	$5,600	$6,400	$7,200	$8,000	$8,800	$9,600	$10,400	$11,200
$1.00	$6,000	$7,000	$8,000	$9,000	$10,000	$11,000	$12,000	$13,000	$14,000
$1.20	$7,200	$8,400	$9,600	$10,800	$12,000	$13,200	$14,400	$15,600	$16,800
$1.40	$8,400	$9,800	$11,200	$12,600	$14,000	$15,400	$16,800	$18,200	$19,600
$1.60	$9,600	$11,200	$12,800	$14,400	$16,000	$17,600	$19,200	$20,800	$22,400
$1.80	$10,800	$12,600	$14,400	$16,200	$18,000	$19,800	$21,600	$23,400	$25,200

Table 12. Estimated net revenues per acre of mature TN blueberries at selected prices and yields, wholesale scenario.

Price \ Yield	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000
$0.80	-$5,717	-$4,917	-$4,117	-$3,317	-$2,517	-$1,717	-$917	-$117	$683
$1.00	-$4,517	-$3,517	-$2,517	-$1,517	-$517	$483	$1,483	$2,483	$3,483
$1.20	-$3,317	-$2,117	-$917	$283	$1,483	$2,683	$3,883	$5,083	$6,283
$1.40	-$2,117	-$717	$683	$2,083	$3,483	$4,883	$6,283	$7,683	$9,083
$1.60	-$917	$683	$2,283	$3,883	$5,483	$7,083	$8,683	$10,283	$11,883
$1.80	$283	$2,083	$3,883	$5,683	$7,483	$9,283	$11,083	$12,883	$14,683

Table 13. Estimated minimum price needed to cover total budgeted costs at selected yields, wholesale scenario.

Wholesale Minimum Price	**6,000**	**7,000**	**8,000**	**9,000**	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**
Minimum Wholesale price per pint needed	$1.75	$1.50	$1.31	$1.17	$1.05	$0.96	$0.88	$0.81	$0.75

Table 14. Estimated total gross revenues per acre of mature TN blueberries at selected prices and yields, 50% PYO / 50% AP scenario.

PYO		3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
	A. Picked	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
$1.00	$1.50	$7,500	$8,750	$10,000	$11,250	$12,500	$13,750	$15,000	$16,250	$17,500
$1.00	$1.60	$7,800	$9,100	$10,400	$11,700	$13,000	$14,300	$15,600	$16,900	$18,200
$1.00	$1.70	$8,100	$9,450	$10,800	$12,150	$13,500	$14,850	$16,200	$17,550	$18,900
$1.00	$1.80	$8,400	$9,800	$11,200	$12,600	$14,000	$15,400	$16,800	$18,200	$19,600
$1.00	$1.90	$8,700	$10,150	$11,600	$13,050	$14,500	$15,950	$17,400	$18,850	$20,300
$1.00	$2.00	$9,000	$10,500	$12,000	$13,500	$15,000	$16,500	$18,000	$19,500	$21,000

Table 15. Estimated net revenues per acre of mature TN blueberries at selected prices and yields, 50% PYO / 50% AP scenario.

PYO		3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
	A. Picked	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
$1.00	$1.50	-$857	$393	$1,643	$2,893	$4,143	$5,393	$6,643	$7,893	$9,143
$1.00	$1.60	-$557	$743	$2,043	$3,343	$4,643	$5,943	$7,243	$8,543	$9,843
$1.00	$1.70	-$257	$1,093	$2,443	$3,793	$5,143	$6,493	$7,843	$9,193	$10,543
$1.00	$1.80	$43	$1,443	$2,843	$4,243	$5,643	$7,043	$8,443	$9,843	$11,243
$1.00	$1.90	$343	$1,793	$3,243	$4,693	$6,143	$7,593	$9,043	$10,493	$11,943
$1.00	$2.00	$643	$2,143	$3,643	$5,143	$6,643	$8,143	$9,643	$11,143	$12,643

Table 16. Estimated already picked minimum price needed to cover total budgeted costs at selected yields, 50% PYO / 50% AP scenario.

Already Picked Minimum Price	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
Minimum Already Pick price per pint needed	$1.79	$1.53	$1.34	$1.19	$1.07	$0.97	$0.89	$0.82	$0.77

Table 17. Estimated total gross revenues per acre of mature TN blueberries at selected prices and yields, 75% PYO / 25% AP scenario.

PYO		4,500	5,250	6,000	6,750	7,500	8,250	9,000	9,750	10,500
	A. Picked	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500
$1.00	$1.50	$6,750	$7,500	$9,000	$10,125	$11,250	$12,375	$13,500	$14,625	$15,750
$1.00	$1.60	$6,900	$8,050	$9,200	$10,350	$11,500	$12,650	$13,800	$14,950	$16,100
$1.00	$1.70	$7,050	$8,225	$9,400	$10,575	$11,750	$12,925	$14,100	$15,275	$16,450
$1.00	$1.80	$7,200	$8,400	$9,600	$10,800	$12,000	$13,200	$14,400	$15,600	$16,800
$1.00	$1.90	$7,350	$8,575	$9,800	$11,025	$12,250	$13,475	$14,700	$15,925	$17,150
$1.00	$2.00	$7,500	$8,750	$10,000	$11,250	$12,500	$13,750	$15,000	$16,250	$17,500

Table 18. Estimated net revenues per acre of mature TN blueberries at selected prices and yields, 75% PYO / 25% AP scenario.

PYO		4,500	5,250	6,000	6,750	7,500	8,250	9,000	9,750	10,500
	A. Picked	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500
$1.00	$1.50	-$339	$411	$1,911	$3,036	$4,161	$5,286	$6,411	$7,536	$8,661
$1.00	$1.60	-$189	$961	$2,111	$3,261	$4,411	$5,561	$6,711	$7,861	$9,011
$1.00	$1.70	-$39	$1,136	$2,311	$3,486	$4,661	$5,836	$7,011	$8,186	$9,361
$1.00	$1.80	$111	$1,311	$2,511	$3,711	$4,911	$6,111	$7,311	$8,511	$9,711
$1.00	$1.90	$261	$1,486	$2,711	$3,936	$5,161	$6,386	$7,611	$8,836	$10,061
$1.00	$2.00	$411	$1,661	$2,911	$4,161	$5,411	$6,661	$7,911	$9,161	$10,411

Table 19. Estimated already picked minimum price needed to cover total budgeted costs at selected yields, 75% PYO / 25% AP scenario.

Already Picked Minimum Price	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500
Minimum Already Pick price per pint needed	$1.73	$1.48	$1.29	$1.15	$1.04	$0.94	$0.86	$0.80	$0.74

Table 20. Financial comparison of the three alternative blueberry marketing scenarios in Tennessee using conservative price and yield estimates.

Financial measure / System	**Maximum Financial Exposition** (Cash outlays until positive cash flows are generated)	**Break Even Year** (Estimated period of time needed to cover the investment)	**Present Value of Net Cash Flows at year 7** (Full production)	**Net Cash Flow** year number 7 (9% Discount Rate)	**Internal Rate of Return** (Discount Interest Rate that makes the NPV equal to 0)
100% Wholesale	($9,515.38)	Year 6	$548.58	$5,701.62	24.09%
75% PYO 25% Already Picked	($9,515.38)	Year 5	$5,031.00	$8,191.62	31.02%
50% PYO 50% Already Picked	($9,515.38)	Year 5	$5,842.00	$8,986.62	32.14%

[1] Assumes yield of 12,000 lbs per acre and price of $1.25, $1.00, $1.50 for Wholesale, PYO and AP respectively.

FIGURES

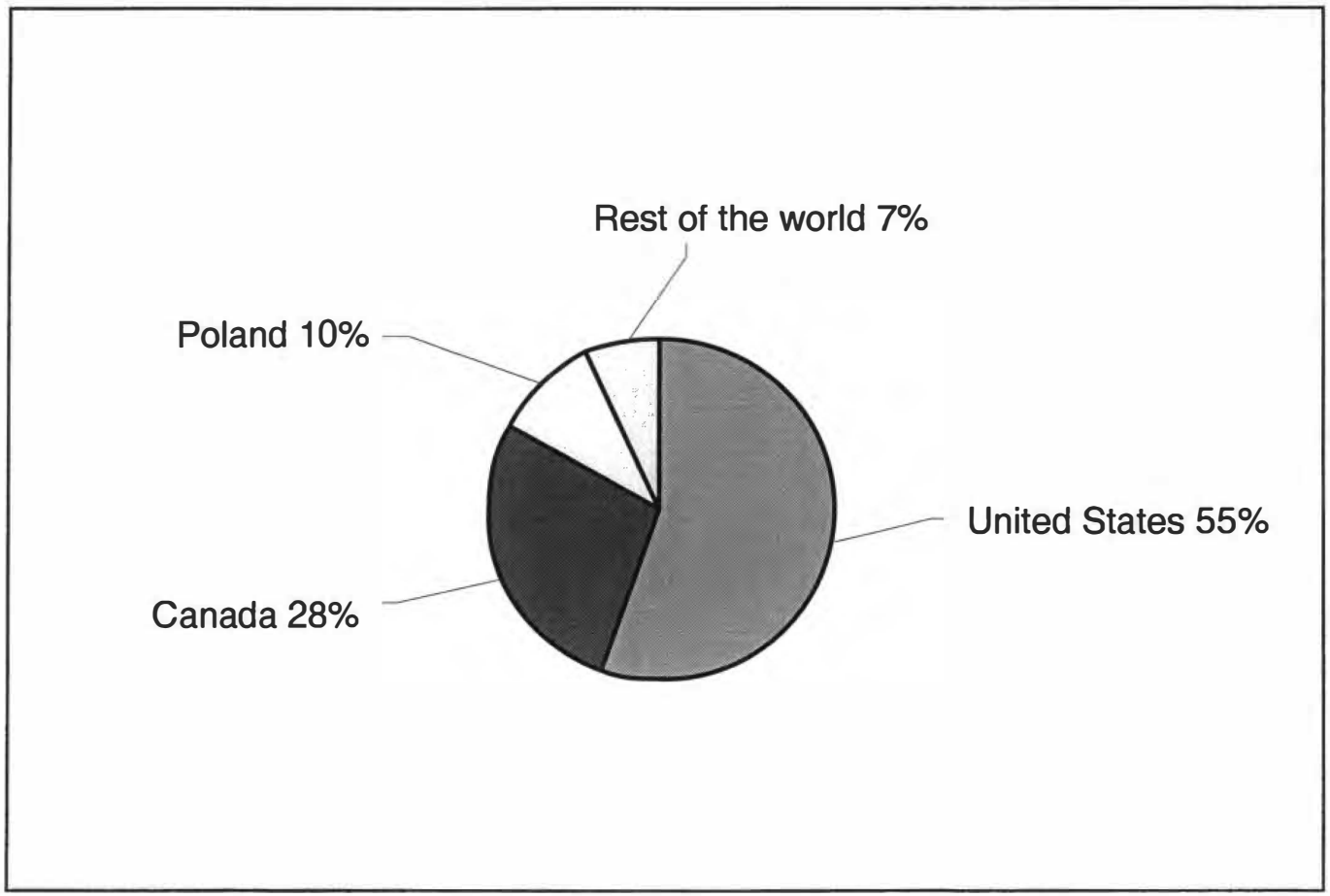


Figure 1. Top world producers of blueberry: Average world market share of 2000-2002 world production. (Source: Food and Agriculture Organization of the United States).

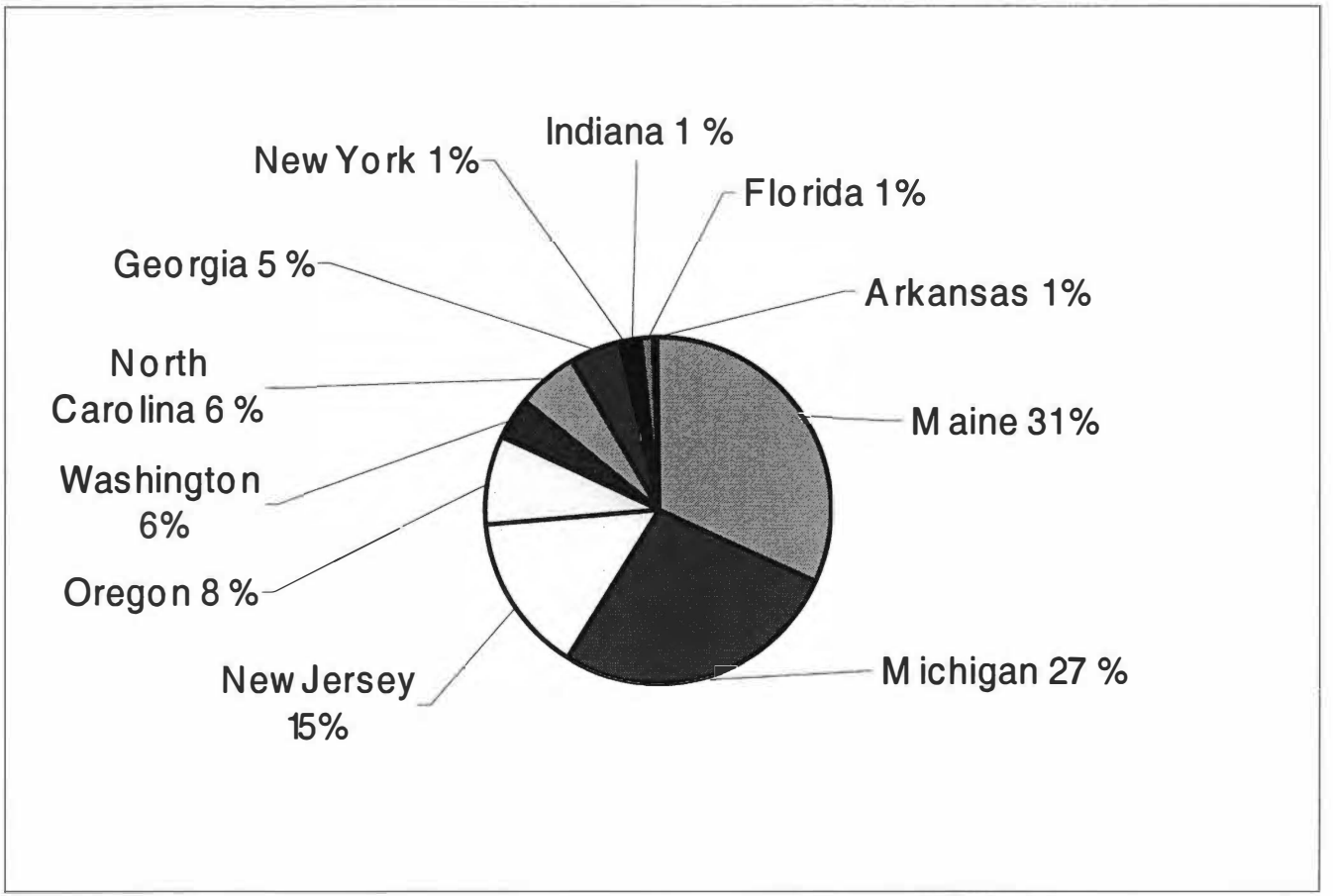


Figure 2. United States blueberry production distribution by state (Sources: New England Agricultural Statistics Service, Oregon Agricultural Statistics Service, Oregon Dept. of Agriculture; Washington Agricultural Statistics Service, State of Washington Dept. of Agriculture; North American Blueberry Council; National Agricultural Statistics Service, and USDA, 1992)

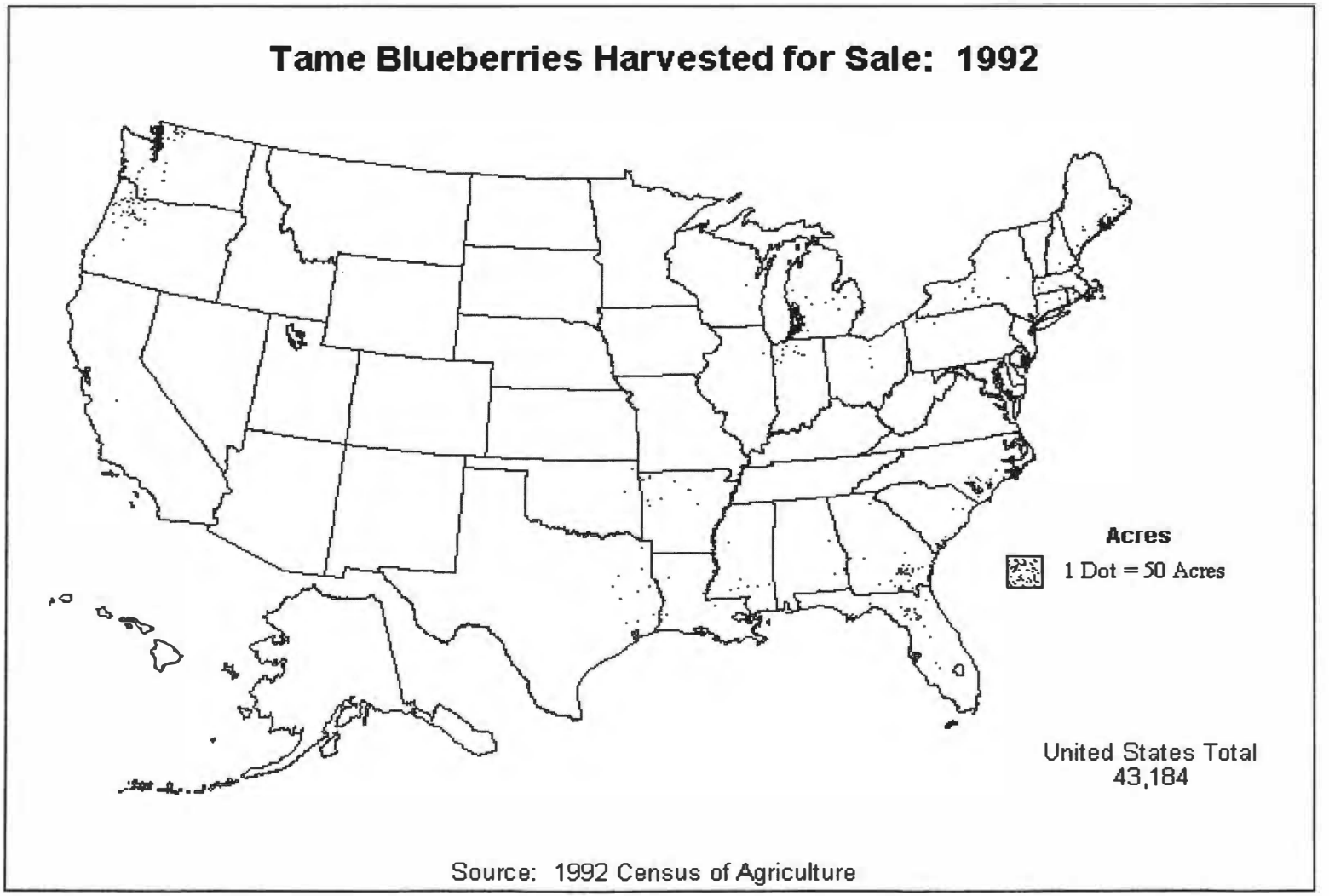


Figure 3.United States blueberries harvested for sale distribution. (Source: NASS)
http://www.nass.usda.gov/census/census92/atlas92/html/m259.htm

Figure 4. United States blueberries production distribution. (Source: Highbush Blueberry Production Guide, October 1992, Page 143)

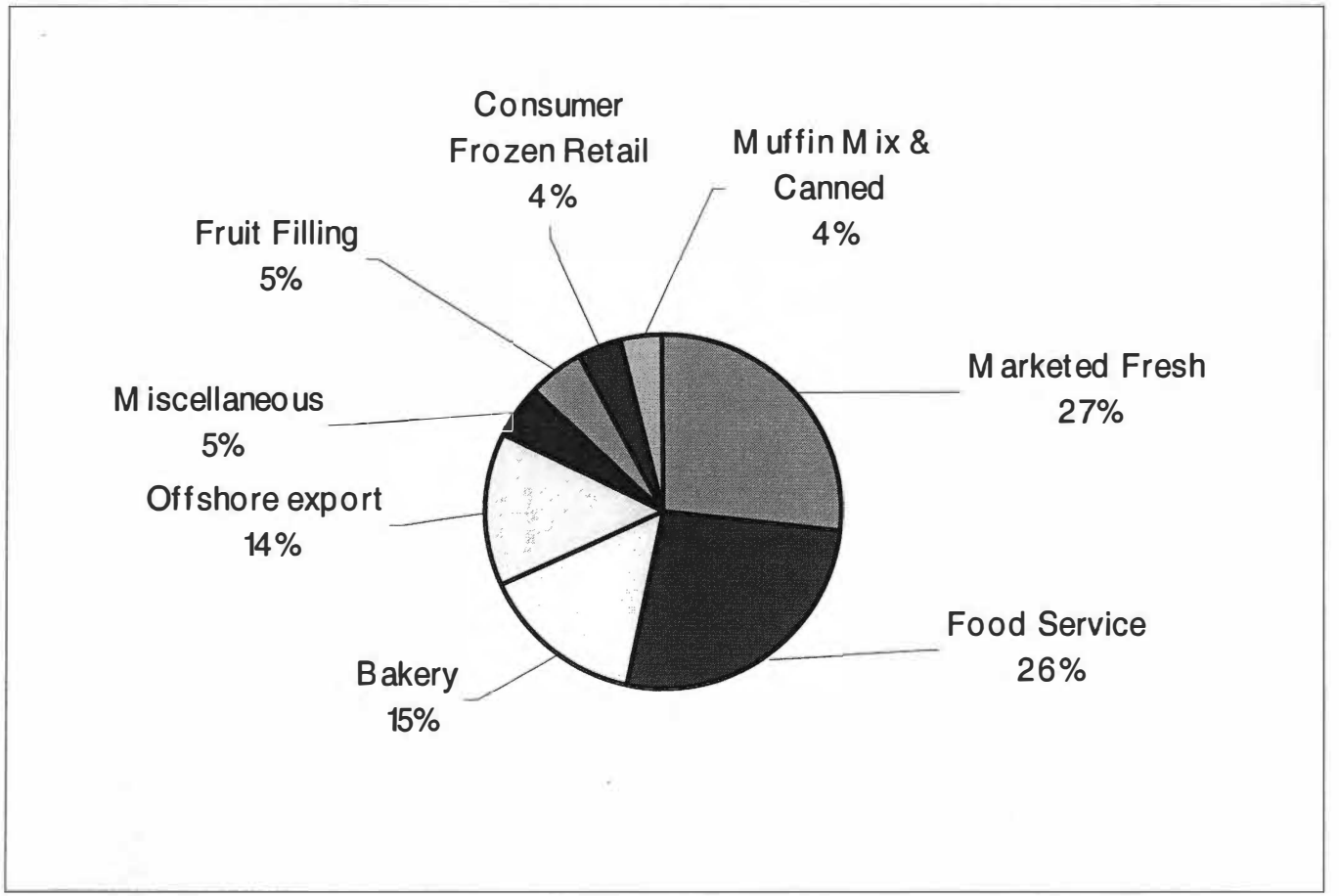


Figure 5. Utilization of North American blueberry production. (Source: North American Blueberry Council).
* Miscellaneous includes yogurt base, preserves, syrup, puree, baby food, concentrate, and juice drinks.
** Latest data available was from 1989.

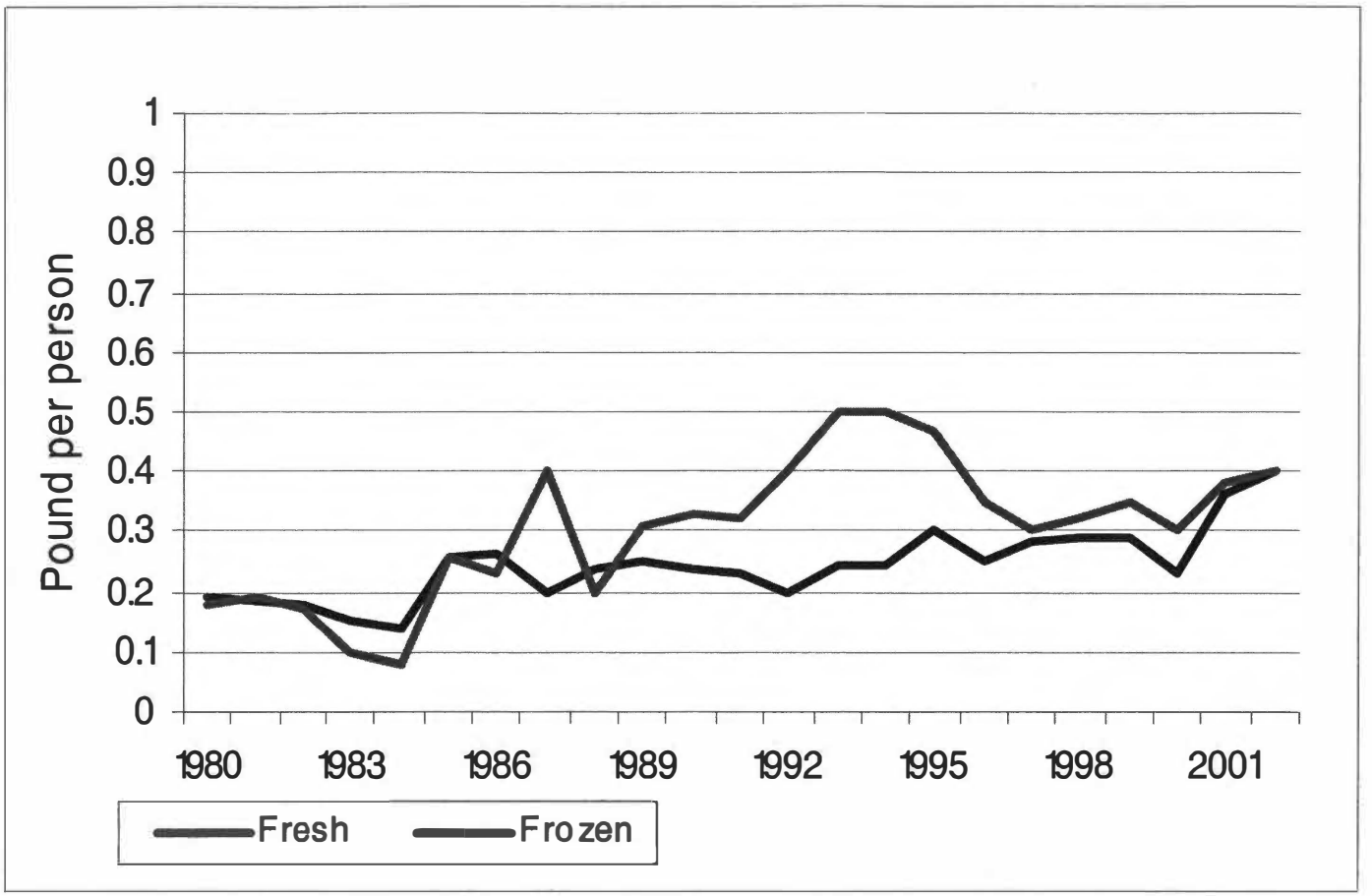


Figure 6. United States per capita consumption of fresh and frozen blueberries (Source: Economic Research Service, USDA) http://www.ers.usda.gov/Briefing/FruitAndTreeNuts/fruitnutpdf/blueberry.pdf

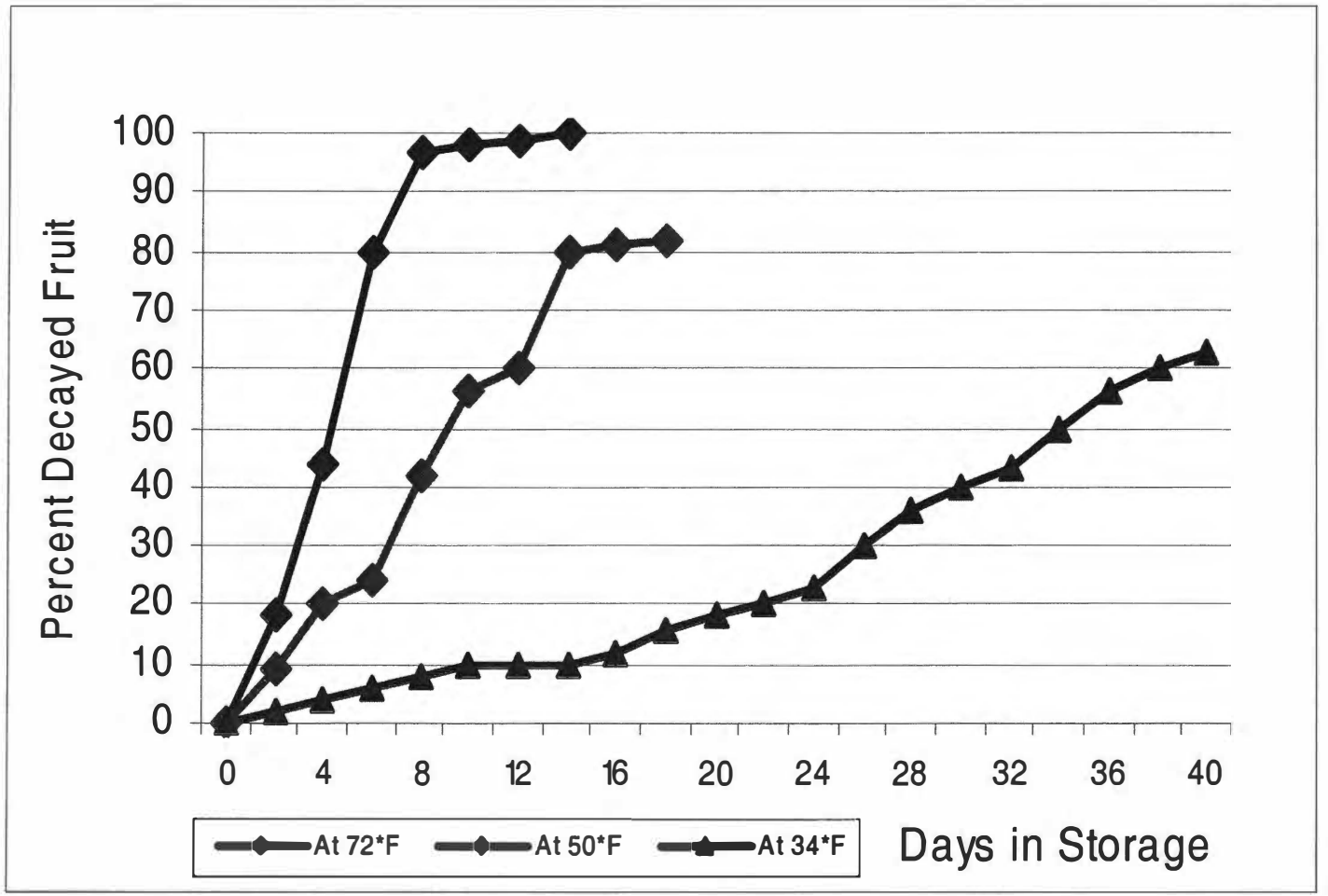


Figure 7. Post-harvest cooling and handling of blueberries. (Source: North Carolina State University) http://www.bae.ncsu.edu/programs/extension/publicat/postharv/ag-413-7/index.html

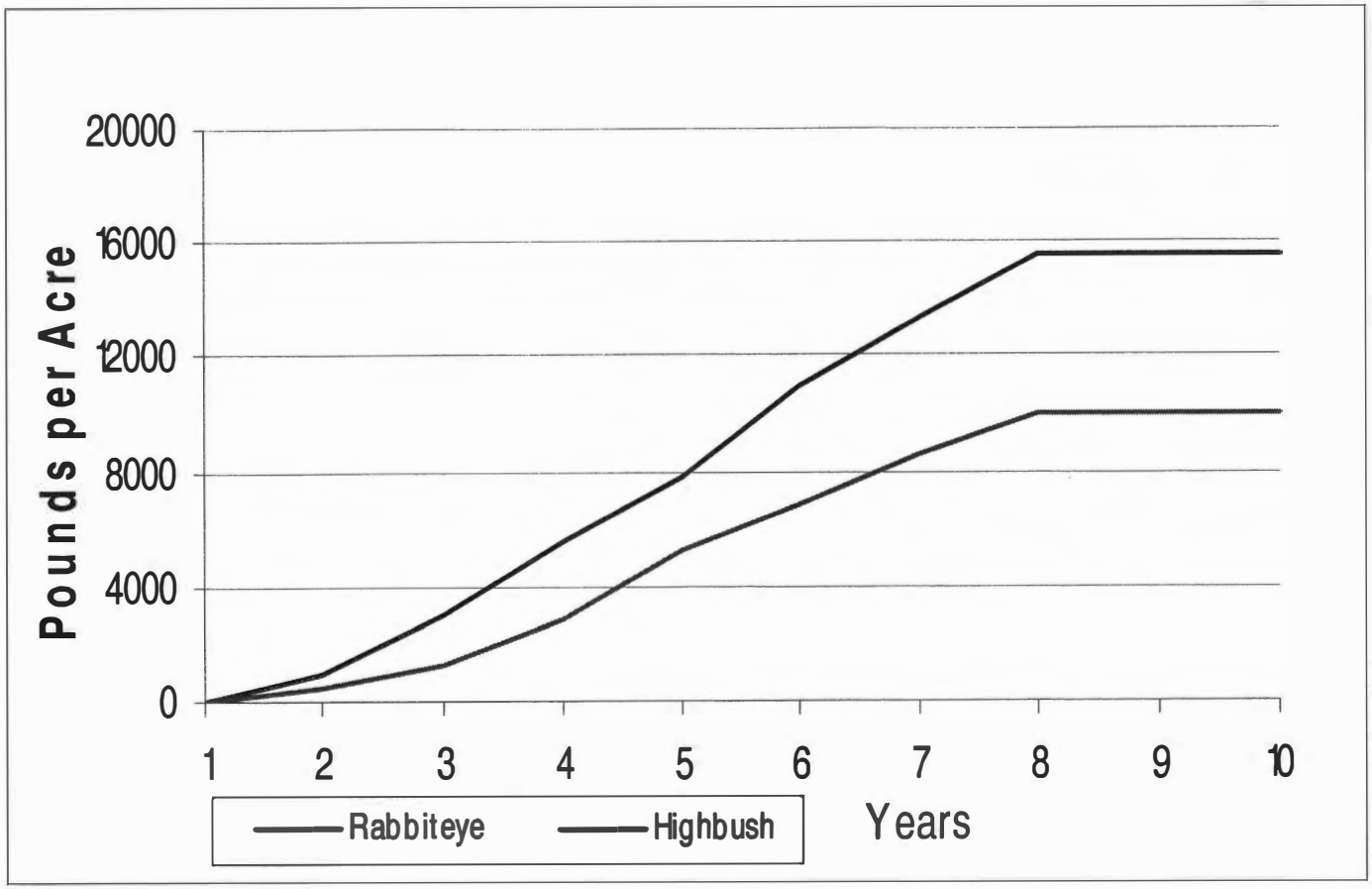


Figure 8. Productivity by variety: Highbush versus Rabbiteye. (Source: University of Florida, Gainesville, 1991)

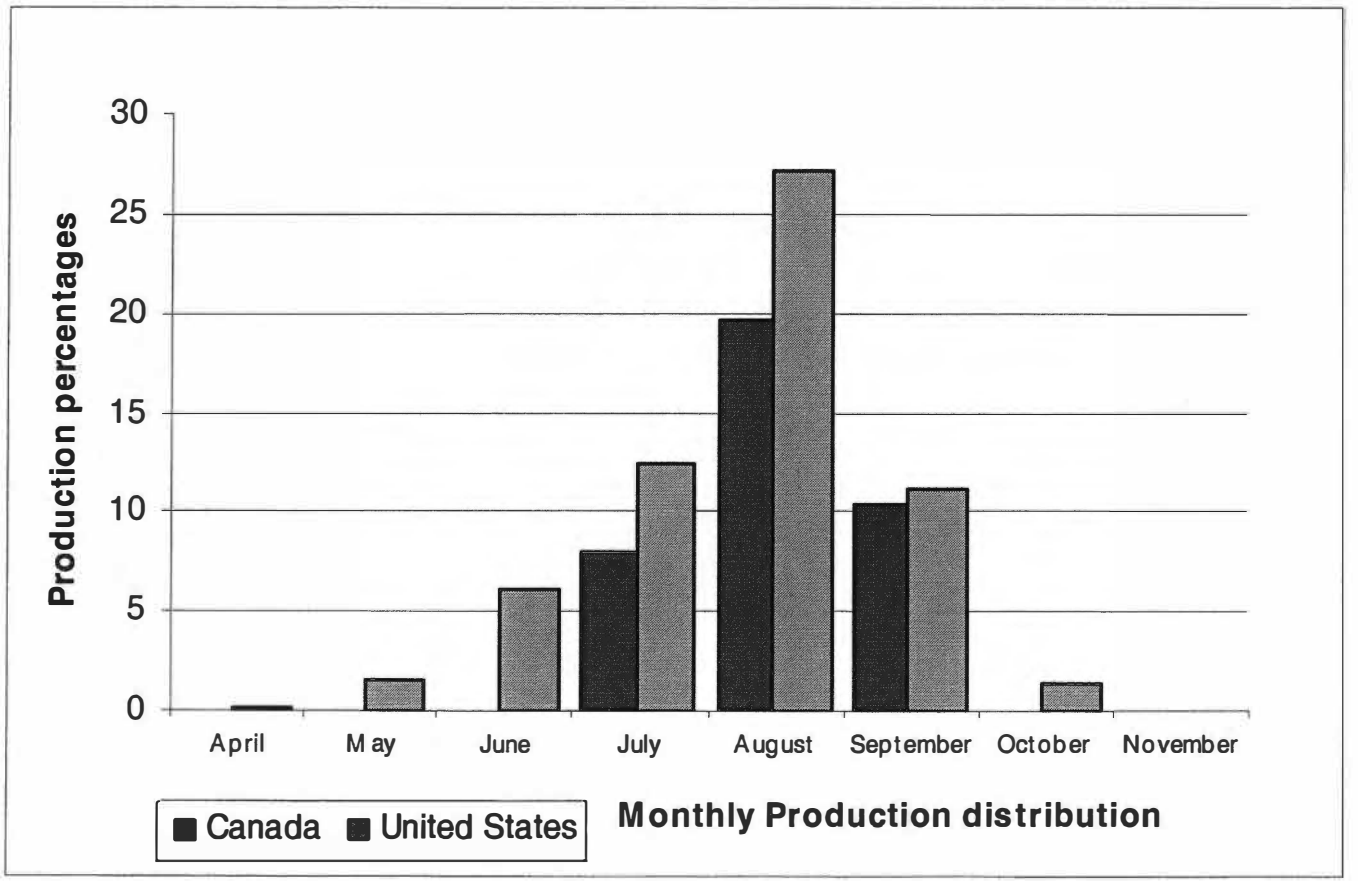


Figure 9. North American blueberry production by month. (Source: "Highbush Blueberry Production Guide", October 1992).

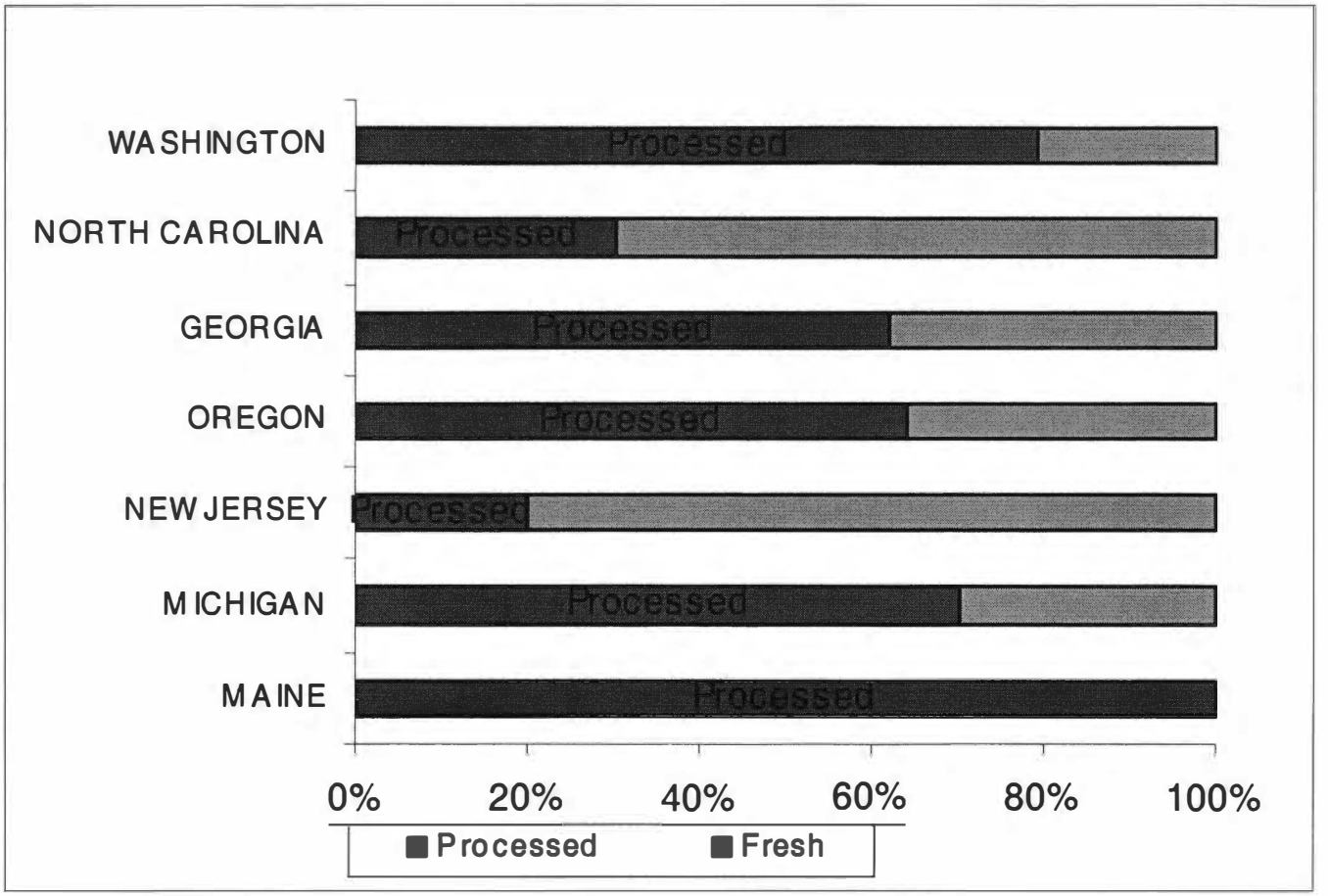


Figure 10. United States blueberries: fresh and processed share of utilized production among major producing states. (Source: National Agricultural Statistics Service, USDA)

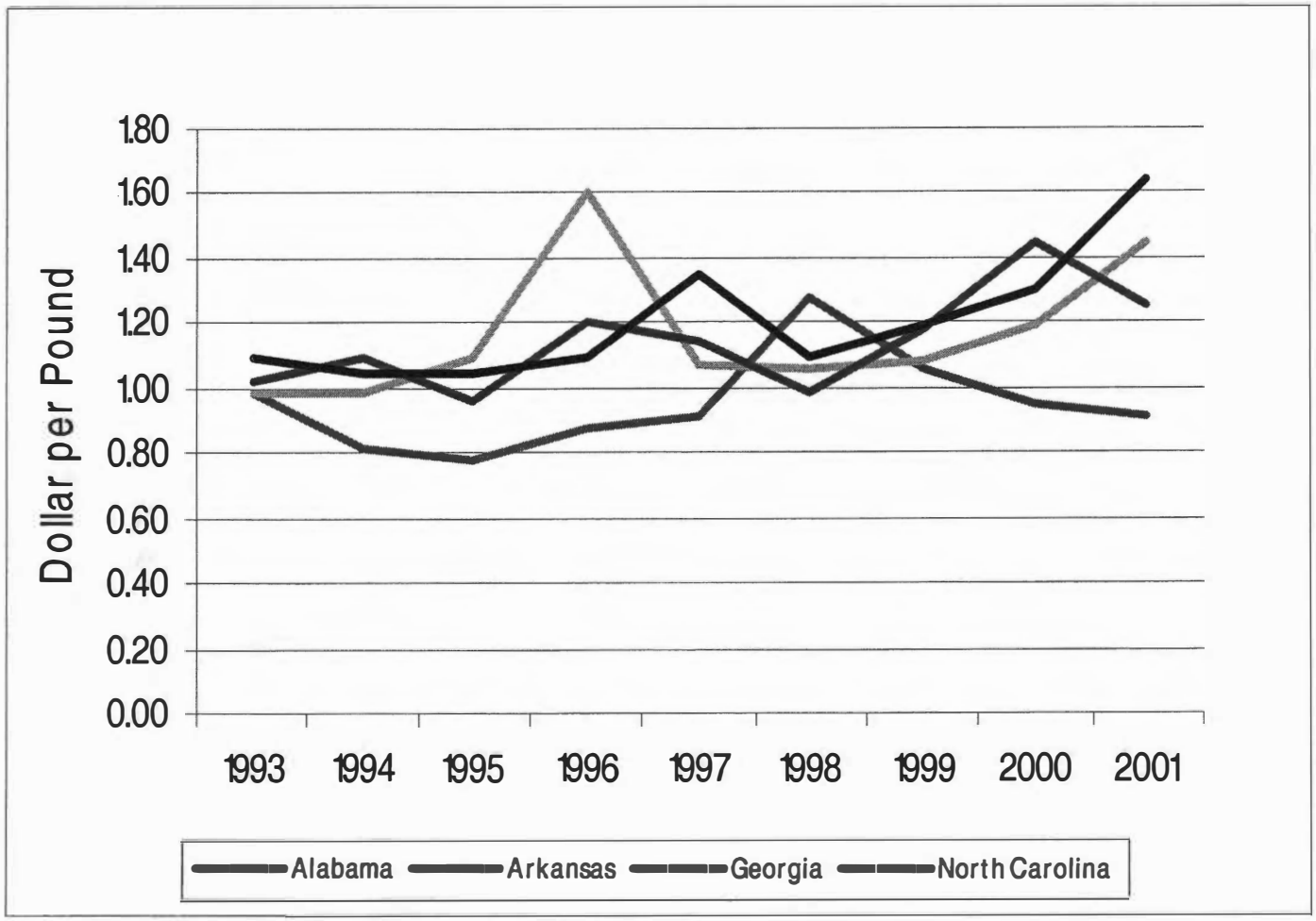


Figure 11. Alabama, Arkansas, Georgia and North Carolina fresh grower price. (Source: Fruit and Tree Nuts Situation and Outlook Yearbook / FTS-2002 /October 2002)

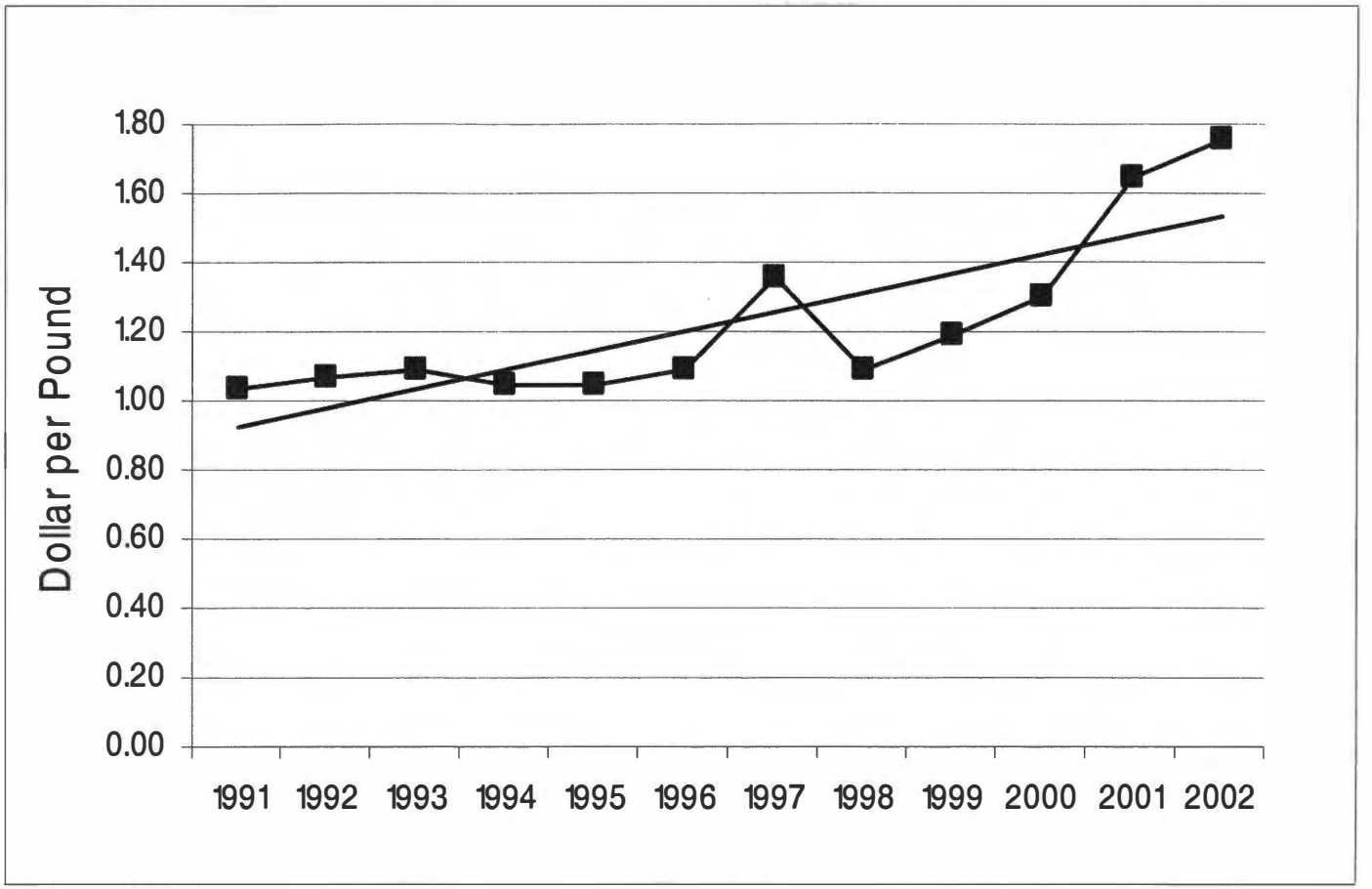


Figure 12. Wholesale prices of blueberries in North Carolina from 1991 to 2001. (Source: Fruit and Tree Nuts Situation and Outlook Yearbook / FTS-2002 /October 2002)

VITA

Alejandro Dellachiesa was born in Buenos Aires, Argentina. In December 1997 he graduated with a B.S. degree in Agricultural Economics from the University of Belgrano. Throughout his education he has taken several courses in water quality, irrigation systems, propagation and commercial quality of grain and seeds.

Shortly after graduating when working as a grains farm manager he studied for a Master Degree in Business Administration in the School of Economy and International Business of the University of Belgrano. After graduating in August 2002 he began studying toward a M.S. degree in Agricultural Economics and received this degree by August 2005. He reentered the University of Tennessee, Knoxville, in August 2005 to pursue a PhD in Economics.